ETSI TS 101 909-8 V1.1.1 (2001-06)

Technical Specification

**Access and Terminals (AT);
Digital Broadband Cable Access to the
Public Telecommunications Network;
IP Multimedia Time Critical Services;
Part 8: Media Terminal Adapter (MTA)
Management Information Base (MIB)**

ETSI

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Access and Terminals (AT).

The present document is part 8 of a multi-part deliverable supporting real-time multimedia services, as identified below:

Part 1: "General";

Part 2: "Architectural framework for the delivery of time critical services over cable Television networks using cable modems";

Part 3: "Audio Codec Requirements for the Provision of Bi-Directional Audio Service over Cable Television Networks using Cable Modems";

Part 4: "Network Call signalling Protocol";

Part 5: "Dynamic Quality of Service for the Provision of Real Time Services over Cable Television Networks using Cable Modems";

Part 6: "Media Terminal Adapter (MTA) device provisioning";

Part 7: "Management Information Base (MIB) Framework";

Part 8: "Media Terminal Adapter (MTA) Management Information Base (MIB)";

Part 9: "Network Call Signalling (NCS) MIB Requirements";

Part 10: "Event Message Requirements for the Provision of Real Time Services over Cable Television Networks using Cable Modems";

Part 11: "Security";

Part 12: "Internet Signalling Transport Protocol";

Part 13: "Trunking Gateway Control Protocol";

Part 14: "Operation System Support".

NOTE 1: The above list is complete for the first version of this Technical Specification (TS) (V1.1.1 2001-06). Additional parts are being proposed and these will be added to the list in future versions.

The present part is part 8 of the above mentioned series of ETSI deliverables and describes IPCablecom MTA MIB requirement.

NOTE 2: The choice of a multi-part format for this deliverable is to facilitate maintenance and future enhancements.

NOTE 3: The term **MUST** or **MUST NOT** is used as a convention in the present document part to denote an absolutely mandatory aspect of the specification.

Introduction

The cable industry in Europe and across other Global regions have already deployed broadband cable television Hybrid Fibre Coax (HFC) data networks running the Cable Modem Protocol. The cable industry is in the rapid stages of deploying IP Voice and other time critical multimedia services over these broadband cable television networks.

The cable industry has recognized the urgent need to develop ETSI Technical Specifications aimed at developing interoperable interface specifications and mechanisms for the delivery of end to end advanced real time IP multimedia time critical services over bi-directional broadband cable networks.

IPCablecom is a set of protocols and associated element functional requirements developed to deliver Quality-of-Service (QoS) enhanced secure IP multimedia time critical communications services using packetized data transmission technology to a consumer's home over the broadband cable television Hybrid Fibre/Coaxial (HFC) data network running the Cable Modem protocol. IPCablecom utilizes a network superstructure that overlays the two-way data-ready cable television network. While the initial service offerings in the IPCablecom product line are anticipated to be Packet Voice, the long-term project vision encompasses packet video and a large family of other packet-based services.

The cable industry is a global market and therefore the ETSI standards are developed to align with standards either already developed or under development in other regions. The ETSI Specifications are consistent with the CableLabs/PacketCable set of specifications as published by the SCTE. An agreement has been established between ETSI and SCTE in the US to ensure, where appropriate, that the release of PacketCable and IPCablecom set of specifications are aligned and to avoid unnecessary duplication. The set of IPCablecom ETSI specifications also refers to ITU-SG9 draft and published recommendations relating to IP Cable Communication.

The whole set of multi-part ETSI deliverables to which the present document belongs specify a Cable Communication Service for the delivery of IP Multimedia Time Critical Services over a HFC Broadband Cable Network to the consumers home cable telecom terminal. " IPCablecom" also refers to the ETSI working group program that shall define and develop these ETSI deliverables.

1   Scope

The present set of documents specify IPCablecom, a set of protocols and associated element functional requirements. These have been developed to deliver Quality-of-Service (QoS), enhanced secure IP multimedia time critical communication services, using packetized data transmission technology to a consumer's home over a cable television Hybrid Fibre/Coaxial (HFC) data network.

   NOTE 1:   IPCablecom set of documents utilize a network superstructure that overlays the two-way data-ready cable
             television network, e.g. as specified within ES 201 488 and ES 200 800.

While the initial service offerings in the IPCablecom product line are anticipated to be Packet Voice and Packet Video, the long-term project vision encompasses a large family of packet-based services. This may require in the future, not only careful maintenance control, but also an extension of the present set of documents.

   NOTE 2:   The present set of documents aims for global acceptance and applicability. It is therefore developed in
             alignment with standards either already existing or under development in other regions and in
             International Telecommunications Union (ITU).

2   References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

ETSI TS 101 909-4: "Access and Terminals (AT); Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 4: Network Call signalling Protocol".

ETSI TS 101 909-6: "Access and Terminals (AT); Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 6: Media Terminal Adapter (MTA) device provisioning".

ETSI TS 101 909-7: "Access and Terminals (AT); Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 7: IPCablecom management information base (MIB) framework".

ETSI TS 101 909-11: "Access and Terminals (AT); Digital Broadband Cable Access to the Public Telecommunications Network; IP Multimedia Time Critical Services; Part 11: Security".

ETSI ES 201 488: "Data-Over-Cable Service Interface Specifications Radio Frequency Interface Specification"

ETSI ES 200 800: "Digital Video Broadcasting (DVB); DVB interaction channel for Cable TV distribution systems (CATV)

ITU-T Recommendation X.680 (1997): "Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation".

ITU-T Recommendation X.681 (1997): "Information technology - Abstract Syntax Notation One (ASN.1): Information object specification".

ITU-T Recommendation X.682 (1997): "Information technology - Abstract Syntax Notation One (ASN.1): Constraint specification".

ITU-T Recommendation X.683 (1997): "Information technology - Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications".

ITU-T Recommendation X.690 (1997): "Information technology - ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)".

RFC 2571 (1999): "An Architecture for Describing SNMP Management Frameworks".

RFC 2572 (1999): "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)".

RFC 2573 (1999): "SNMP Applications".

RFC 2574 (1999): "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Cable Modem: layer two termination device that terminates the customer end of the J.112 connection

IPCablecom: ETSI working group project that includes an architecture and a series of Specifications that enable the delivery of real time services (such as telephony) over the cable television networks using Cable Modems

MIB (Management Information Base): specification of information in a manner that allows standard access through a network management protocol

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

HFC	Hybrid Fibre Coax
MIB	Management Information Base
MTA	Media Terminal Adaptor
QoS	Quality of service

4 Requirements

This clause defines the mandatory syntax of the IPCablecom MTA MIB. It follows the IETF Simple Network Management Protocol (SNMP) for defining the managed objects. The MIB is organized as follows:

- MTA device objects;

- MTA security objects;

- objects used for initial provisioning and bootstrapping;

- objects used for event reporting to syslog, trap, local local.

The syntax is given below.

```
PKTC-MTA-MIB DEFINITIONS ::= BEGIN
IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
          Integer32,
          Unsigned32,
          Counter32,
    NOTIFICATION-TYPE
        FROM SNMPv2-SMI
          TruthValue, DisplayString, DateAndTime, RowStatus
        FROM SNMPv2-TC
          OBJECT-GROUP,
```

```
    MODULE-COMPLIANCE
        FROM SNMPv2-CONF
            clabProjIPCablecom
        FROM CLAB-DEF-MIB
            ifIndex
        FROM IF-MIB
           docsDevSwCurrentVers
        FROM DOCS-CABLE-DEVICE-MIB;       -- version 8

pktcMtaMib MODULE-IDENTITY
    LAST-UPDATED    "9912010000Z" -- December 1, 1999
    ORGANIZATION    "IPCablecom OSS Group"
    CONTACT-INFO
            "Roy Spitzer
            Postal: Telogy Networks, Inc.
            20250 Century Blvd.
            Germantown, MD 20855
            U.S.A.
            Phone:  +1 301-515-6531
            Fax:    +1 301-515-7954
            E-mail: rspitzer@telogy.com"
    DESCRIPTION
            "This MIB module supplies the basic management objects
            for the MTA Device"
    ::=  { 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))


--
--   IPCablecom supports embedded MTA only
--   IPCablecom requires SNMPv3
--

pktcMtaMibObjects       OBJECT IDENTIFIER ::= { pktcMtaMib 1 }
pktcMtaDevBase          OBJECT IDENTIFIER ::= { pktcMtaMibObjects 1 }
pktcMtaDevServer        OBJECT IDENTIFIER ::= { pktcMtaMibObjects 2 }
pktcMtaDevSecurity      OBJECT IDENTIFIER ::= { pktcMtaMibObjects 3 }
pktcMtaDevEvent         OBJECT IDENTIFIER ::= { pktcMtaMibObjects 4 }


--
-- 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)."
    ::= { pktcMtaDevBase 1 }

pktcMtaDevSerialNumber OBJECT-TYPE
    SYNTAX      DisplayString (SIZE (0..128))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The manufacturer's serial number for this MTA."
    ::= { pktcMtaDevBase 2 }
pktcMtaDevHardwareVersion OBJECT-TYPE
    SYNTAX      DisplayString (SIZE (0..48))
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The manufacturer's hardware version for this MTA."
    ::= { pktcMtaDevBase 3 }
```

```
pktcMtaDevMacAddress  OBJECT-TYPE
    SYNTAX        OCTET STRING
    MAX-ACCESS  read-only
    STATUS        current
    DESCRIPTION
            "The telephony MAC address for this device."
    ::= { pktcMtaDevBase 4 }

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

pktcMtaDevEndPntCount    OBJECT-TYPE
    SYNTAX        INTEGER (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
            "The MTA Admin Status of this device, where True(1) means
            the voice feature is enabled and false(2) indicates that
            it is disabled."
    ::= { pktcMtaDevBase 7 }


pktcMtaDevTypeIdentifier    OBJECT-TYPE
    SYNTAX      DisplayString
    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),
            fail(3)
    }
    MAX-ACCESS  read-only
    STATUS        current
    DESCRIPTION
            "This object indicates the completion state of the
     provisioning process. Pass or Fail states occur after processing
     of the config file is completed. InProgress occurs from boot
     time until config file processing is complete. Fail state requires
     manual intervention."
    ::= { 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."
    ::= { pktcMtaDevBase 10 }
```

```
--
-- The following group describes the security objects in the MTA
--
pktcMtaDevManufacturerCertificate OBJECT-TYPE
     SYNTAX       X509Certificate
     MAX-ACCESS  read-only
     STATUS       current
     DESCRIPTION
"ASN.1 DER encoding of the MTA Manufacturer's X.509 public-key
certificate, called MTA Manufacturer Certificate. It is issued to each
MTA manufacturer and is installed into each MTA either in the factory
or with a code download. The provisioning server cannot update this
certificate."
     ::= { pktcMtaDevSecurity 1 }

pktcMtaDevCertificate OBJECT-TYPE
     SYNTAX       X509Certificate.
     MAX-ACCESS  read-only
     STATUS       current
     DESCRIPTION

"ASN.1 DER encoding of the MTA's X.509 public-key certificate
issued by the manufacturer and installed into the embedded-MTA in
the factory. This certificate, called MTA Device Certificate, contains
the MTA's MAC address. It cannot be updated by the provisioning
server."
     ::= { pktcMtaDevSecurity 2 }



pktcMtaDevSignature OBJECT-TYPE
     SYNTAX       OCTET STRING (SIZE (0..256))
     MAX-ACCESS  read-only
     STATUS       current
     DESCRIPTION
      "A unique signature created by the MTA for each SNMP Inform
      or SNMP Trap or SNMP GetResponse message exchanged prior to
      enabling SNMPv3 security ASN.1 encoded Digital signature in
      the Cryptographic message syntax (includes nonce). "
     ::= { pktcMtaDevSecurity 3 }

pktcMtaDevCorrelationId OBJECT-TYPE
     SYNTAX       Integer32
     MAX-ACCESS  read-only
     STATUS       current
     DESCRIPTION
            " Random value generated by the MTA for use in registration
              authorization.  It is for use only in the MTA initialization
              messages and for MTA configuration file download "
     ::= { pktcMtaDevSecurity 4 }


pktcMtaDevSecurityTable OBJECT-TYPE
     SYNTAX       SEQUENCE OF PktcMtaDevSecurityEntry
     MAX-ACCESS  not-accessible
     STATUS       current
     DESCRIPTION
            "Contains per endpoint security information."
     ::= {  pktcMtaDevSecurity 5 }

pktcMtaDevSecurityEntry OBJECT-TYPE
     SYNTAX       PktcMtaDevSecurityEntry
     MAX-ACCESS  not-accessible
     STATUS       current
     DESCRIPTION
        "List of security attributes for a single IPCablecom
         endpoint interface associated with ifType(104)."
     INDEX { ifIndex }
     ::= { pktcMtaDevSecurityTable 1 }
```

```
PktcMtaDevSecurityEntry ::= SEQUENCE {
    pktcMtaDevServProviderCertificate OCTET STRING,
    pktcMtaDevTelephonyCertificate OCTET STRING,
    pktcMtaDevKerberosRealm OCTET STRING,
    pktcMtaDevKerbPrincipalName DisplayString,
    pktcMtaDevServGracePeriod Integer32,
     pktcMtaDevLocalSystemCertificate OCTET STRING,
    pktcMtaDevKeyMgmtTimeout1 Integer32,
    pktcMtaDevKeyMgmtTimeout2 Integer32
    }

 pktcMtaDevServProviderCertificate OBJECT-TYPE
    SYNTAX       X509Certificate.
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION

"ASN.1 DER encoding of the Telephony Service Provider's X.509
public-key certificate, called Service Provider Certificate. It serves as the root of the intra-
domain trust hierarchy. Each MTA is
configured with this certificate so that it can authenticate KDCs
owned by the same service provider. The provisioning server needs
the ability to update this certificate in the MTAs via both SNMP and
configuration files."
    ::= { pktcMtaDevSecurityEntry 1 }

pktcMtaDevTelephonyCertificate OBJECT-TYPE
    SYNTAX       X509Certificate
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION

"ASN.1 DER encoding of the MTA's X.509 public-key certificate
issued by the Service Provider with either the Service Provider CA or
a Local System CA. This certificate, called MTA Telephony
Certificate, contains the same public key as the MTA Device
Certificate issued by the manufacturer. It is used to authenticate the
identity of the MTA to the TGS (during PKINIT exchanges). The
provisioning server needs the ability to update this certificate in the
MTAs via both SNMP and configuration files."
    ::= { pktcMtaDevSecurityEntry 2 }

pktcMtaDevKerberosRealm OBJECT-TYPE
    SYNTAX       OCTET STRING (SIZE (0..1280))
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        " Specifies a Kerberos realm (i.e. administrative domain), required
          for IPCablecom key management]."
    ::= { pktcMtaDevSecurityEntry 3 }

pktcMtaDevKerbPrincipalName OBJECT-TYPE
    SYNTAX       DisplayString (SIZE(0..40))
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "Kerberos principal name for the Call Agent.  This information
             is required in order for the MTA to obtain Call Agent Kerberos
             tickets.  This principal name does not include the realm, which
             is specified as a separate field in this configuration file.  A
             Single Kerberos principal name MAY be shared among several
             Call Agents."
    ::= { pktcMtaDevSecurityEntry 4 }
```

```
pktcMtaDevServGracePeriod OBJECT-TYPE
    SYNTAX       Integer32 (15..600)
    MAX-ACCESS   read-write
    STATUS       current
    DESCRIPTION
            " The MTA MUST obtain a new Kerberos ticket (with a PKINIT
             exchange) this many minutes before the old ticket expires.  The
             minimum allowable value is 15 mins.  The default is 30 mins."
    DEFVAL { 30 }
    ::= { pktcMtaDevSecurityEntry 5 }
pktcMtaDevLocalSystemCertificate OBJECT-TYPE
    SYNTAX       X509Certificate.
    MAX-ACCESS   read-write
    STATUS       current
DESCRIPTION      "Telephony Service Provider CA may delegate the issuance of certificates to a
regional Certification Authority called Local System CA (with the corresponding Local System
Certificate).  This parameter is the ASN.1 DER encoding of the Local System Certificate.  It MUST
have a non-empty value when the MTA Telephony certificate is signed by a Local System CA.
Otherwise, the value MUST be of length 0"
    ::= { PktcMtaDevSecurityEntry 6 }
pktcMtaDevKeyMgmtTimeout1 OBJECT-TYPE
    SYNTAX       Integer32 (15..600)
    UNITS        "seconds"
    MAX-ACCESS   read-write
    STATUS       current
DESCRIPTION   "This timeout applies only when the MTA initiated key management.  It is the period
during which the MTA will save a nonce (inside the sequence number field) from the sent out AP
Request and wait for the matching AP Reply from the CMS."
    ::= { pktcMtaDevSecurityEntry 7 }
pktcMtaDevKeyMgmtTimeout2 OBJECT-TYPE
    SYNTAX       Integer32 (15..600)
    UNITS        "seconds"
    MAX-ACCESS   read-write
    STATUS       current
DESCRIPTION      "This timeout applies only when the CMS initiated key management (with a Wake Up or
Rekey message).  It is the period during which the MTA will save a nonce (inside the sequence number
field) from the sent out AP Request and wait for the matching AP Reply from the CMS."
    ::= { pktcMtaDevSecurityEntry 8}
pktcMtaDevTgsTable OBJECT-TYPE
    SYNTAX       SEQUENCE OF PktcMtaDevTgsEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
            "Contains per endpoint Ticket Granting Server information."
    ::= { pktcMtaDevSecurity 8 }
pktcMtaDevTgsEntry OBJECT-TYPE
    SYNTAX       PktcMtaDevTgsEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "List of Tgs attributes for a single IPCablecom
         endpoint interface associated with ifType(104)."
    INDEX { ifIndex, pktcMtaDevTgsIndex }
    ::= { pktcMtaDevTgsTable 1 }
PktcMtaDevTgsEntry ::= SEQUENCE {
    pktcMtaDevTgsIndex Integer32,
    pktcMtaDevTgsLocation DisplayString,
    pktcMtaDevTgsStatus RowStatus
    }

pktcMtaDevTgsIndex OBJECT-TYPE
    SYNTAX       Integer32
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
            "Index into the TGS table for TGS locations.
             IfType specifies the endpoint, TgsIndex specifies a TGS."
    ::= { pktcMtaDevTgsEntry 1 }
```

```
pktcMtaDevTgsLocation OBJECT-TYPE
    SYNTAX       DisplayString (SIZE (0..255))
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
             " Name of the TGS - Ticket Granting Server, which is the Kerberos
               Server.  This parameter is a FQDN or Ipv4 address.  There may be
               multiple entries of this type.  The order in which these entries
               are listed is the priority order in which the MTA will attempt to
               contact them for this endpoint."
    ::= { pktcMtaDevTgsEntry 2 }

pktcMtaDevTgsStatus    OBJECT-TYPE
    SYNTAX       RowStatus
    MAX-ACCESS    read-create
    STATUS       current
    DESCRIPTION
             "This object contains the Row Status associated with
              the pktcMtaDevTgsTable."
    ::= { pktcMtaDevTgsEntry 3 }
--
-- The following group describes server access and parameters used for
-- initial provisioning and bootstrapping.
--
pktcMtaDevServerBootState OBJECT-TYPE
    SYNTAX INTEGER {
             operational(1),
             disabled(2),
             waitingForDhcpOffer(3),
             waitingForDhcpResponse(4),
             waitingForConfig(5),
             refusedByCmts(6),
             other(7),
             unknown(8)
    }
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
             "If operational(1), the device has completed loading and
              processing of configuration parameters and the Access Node has
              completed the Registration exchange.
              If disabled(2) then the device was administratively
              disabled, possibly by being refused network access in the
              configuration file.
              If waitingForDhcpOffer(3) then a DHCP Discover has been
              transmitted and no offer has yet been received.
              If waitingForDhcpResponse(4) then a DHCP Request has been
              transmitted and no response has yet been received.
              If waitingForConfig(5) then a request to the config parameter
              server has been made and no response received.
              If refusedByCmts(6) then the Registration Request/Response
              exchange with the Access Node failed. "

    ::= { pktcMtaDevServer 1 }

pktcMtaDevServerDhcp OBJECT-TYPE
    SYNTAX       DisplayString
    MAX-ACCESS   read-write
    STATUS       current
    DESCRIPTION
             "The IP address or FQDN of the DHCP server that assigned an IP
              address to this device. Returns 0.0.0.0 if DHCP was not
              used for IP address assignment."
    ::= { pktcMtaDevServer 2 }

pktcMtaDevServerDns1 OBJECT-TYPE
    SYNTAX       DisplayString
    MAX-ACCESS   read-write
    STATUS       current
    DESCRIPTION
             "The IP address or FQDN of the primary DNS server that resolved
              an IP address for this device. "
    ::= { pktcMtaDevServer 3 }
```

```
pktcMtaDevServerDns2 OBJECT-TYPE
    SYNTAX      DisplayString
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
"The IP address or FQDN of the secondary DNS server that resolved an IP address for this device. "
    ::= { pktcMtaDevServer 4 }

pktcMtaDevConfigFile OBJECT-TYPE    SYNTAX      DisplayString
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "The URL of the TFTP/HTTP file for downloading provisioning
             and configuration parameters to this device. Returns NULL if the
             server address is unknown. Supports both TFTP and HTTP"
    ::= { pktcMtaDevServer 5 }

pktcMtaDevSnmpEntity OBJECT-TYPE
    SYNTAX      DisplayString
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "The IP address or FQDN of the SNMP entity for provisioning trap
handling that assigned an IP address to this device. Returns
0.0.0.0 if DHCP was not used for IP address assignment."
    ::= { pktcMtaDevServer 6 }
--
-- Event Reporting
--

pktcMtaDevEvControl OBJECT-TYPE
    SYNTAX INTEGER {
            resetLog(1),
            useDefaultReporting(2)
    }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "Setting this object to resetLog(1) empties the event log.
             All data is deleted. Setting it to useDefaultReporting(2)
             returns all event priorities to their factory-default
             reporting. Reading this object always returns
             useDefaultReporting(2)."
    ::= { pktcMtaDevEvent 1 }

pktcMtaDevEvSyslog OBJECT-TYPE
    SYNTAX      DisplayString
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "The IP address or FQDN of the Syslog server. If 0.0.0.0,
             syslog transmission is inhibited."
    ::= { pktcMtaDevEvent 2 }

pktcMtaDevEvThrottleAdminStatus OBJECT-TYPE
    SYNTAX INTEGER {
            unconstrained(1),
            maintainBelowThreshold(2),
            stopAtThreshold(3),
            inhibited(4)
    }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "Controls the transmission of traps and syslog messages
             with respect to the trap pacing threshold.
             unconstrained(1) causes traps and syslog messages to be
             transmitted without regard to the threshold settings.
             maintainBelowThreshold(2) causes trap transmission and
             syslog messages to be suppressed if the number of traps
             would otherwise exceed the threshold.
             stopAtThreshold(3) causes trap transmission to cease
             at the threshold, and not resume until directed to do so.
             inhibited(4) causes all trap transmission and syslog
             messages to be suppressed.
```

```
                     A single event is always treated as a single event for
                     threshold counting. That is, an event causing both a trap
                     and a syslog message is still treated as a single event.

                     Writing to this object resets the thresholding state.

                     At initial startup, this object has a default value of
                     unconstrained(1)."
          ::= { pktcMtaDevEvent 3 }

pktcMtaDevEvThrottleInhibited OBJECT-TYPE
     SYNTAX       TruthValue
     MAX-ACCESS   read-only
     STATUS       current
     DESCRIPTION
             "If true(1), trap and syslog transmission is currently
             inhibited due to thresholds and/or the current setting of
             pktcMtaDevEvThrottleAdminStatus. In addition, this is set to
             true(1) if transmission is inhibited due to no
             syslog (pktcMtaDevEvSyslog) or trap (pktcMtaDevNmAccessEntry)
             destinations having been set."
          ::= { pktcMtaDevEvent 4 }

pktcMtaDevEvThrottleThreshold OBJECT-TYPE
     SYNTAX       Unsigned32
     MAX-ACCESS   read-write
     STATUS       current
     DESCRIPTION
             "Number of trap/syslog events per pktcMtaDevEvThrottleInterval
              to be transmitted before throttling.

              A single event is always treated as a single event for
              threshold counting. That is, an event causing both a trap
              and a syslog message is still treated as a single event.

              At initial startup, this object returns 0."
          ::= { pktcMtaDevEvent 5 }

pktcMtaDevEvThrottleInterval OBJECT-TYPE
     SYNTAX       Integer32 (1..2147483647)
     UNITS        "seconds"
     MAX-ACCESS   read-write
     STATUS       current
     DESCRIPTION
             "The interval over which the trap threshold applies.
              At initial startup, this object has a value of 1."
          ::= { pktcMtaDevEvent 6 }

--
-- The following table controls the reporting of the various classes of
-- events.
--

pktcMtaDevEvControlTable OBJECT-TYPE
     SYNTAX       SEQUENCE OF PktcMtaDevEvControlEntry
     MAX-ACCESS   not-accessible
     STATUS       current
     DESCRIPTION
             "This table allows control of the reporting of event classes.
         For each event priority, a combination of logging and
         reporting mechanisms may be chosen. The mapping of event types
         to priorities is vendor-dependent. Vendors may also choose to
         allow the user to control that mapping through proprietary means."
          ::= {  pktcMtaDevEvent 7 }

pktcMtaDevEvControlEntry OBJECT-TYPE
     SYNTAX       PktcMtaDevEvControlEntry
     MAX-ACCESS   not-accessible
     STATUS       current
     DESCRIPTION
             "Allows configuration of the reporting mechanisms for a
              particular event priority."
     INDEX { pktcMtaDevEvPriority }
     ::= { pktcMtaDevEvControlTable 1 }
```

```
pktcMtaDevEvControlEntry ::= SEQUENCE {
    pktcMtaDevEvPriority       INTEGER,
    pktcMtaDevEvReporting      BITS
    }

pktcMtaDevEvPriority OBJECT-TYPE
    SYNTAX INTEGER {
            emergency(1),
            alert(2),
            critical(3),
            error(4),
            warning(5),
            notice(6),
            information(7),
            debug(8)
    }
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "The priority level that is controlled by this
             entry. These are ordered from most (emergency) to least (debug)
             critical.  Each event with a CM or Access Node has a particular
             priority level associated with it (as defined by the
             vendor). During normal operation no event more critical than
             notice(6) should be generated. Events between warning and
             emergency should be generated at appropriate levels of
             problems (e.g. emergency when the box is about to
             crash)."
    ::= { pktcMtaDevEvControlEntry 1 }

pktcMtaDevEvReporting OBJECT-TYPE
    SYNTAX BITS {
            local(0),
            traps(1),
            syslog(2)
    }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
            "Defines the action to be taken on occurrence of this
             event class. Implementations may not necessarily support
             all options for all event classes, but at minimum must
             allow traps and syslogging to be disabled. If the
             local(0) bit is set, then log to the internal log, if the
             traps(1) bit is set, then generate a trap, if the
             syslog(2) bit is set, then send a syslog message
             (assuming the syslog address is set)."
    ::= { pktcMtaDevEvControlEntry 2 }

pktcMtaDevEventTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF PktcMtaDevEventEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "Contains a log of network and device events that may be
             of interest in fault isolation and troubleshooting."
    ::= {  pktcMtaDevEvent 8 }

pktcMtaDevEventEntry OBJECT-TYPE
    SYNTAX      PktcMtaDevEventEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "Describes a network or device event that may be of
             interest in fault isolation and troubleshooting. Multiple
             sequential identical events are represented by
             incrementing pktcMtaDevEvCounts and setting
             pktcMtaDevEvLastTime to the current time rather than creating
             multiple rows.

             Entries are created with the first occurrence of an event.
             pktcMtaDevEvControl can be used to clear the table.
             Individual events can not be deleted."
    INDEX { pktcMtaDevEvIndex }
    ::= { pktcMtaDevEventTable 1 }
```

```
PktcMtaDevEventEntry ::= SEQUENCE {
            pktcMtaDevEvIndex         INTEGER,
            pktcMtaDevEvFirstTime     DateAndTime,
            pktcMtaDevEvLastTime      DateAndTime,
            pktcMtaDevEvCounts        Counter32,
            pktcMtaDevEvLevel         INTEGER,
            pktcMtaDevEvId            Unsigned32,
            pktcMtaDevEvText          DisplayString
        }

pktcMtaDevEvIndex OBJECT-TYPE
    SYNTAX      INTEGER (1..2147483647)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "Provides relative ordering of the objects in the event
             log. This object will always increase except when
             (a) the log is reset via pktcMtaDevEvControl,
             (b) the device reboots and does not implement non-volatile
             storage for this log, or (c) it reaches the value 2^31.
             The next entry for all the above cases is 1."
    ::= { pktcMtaDevEventEntry 1 }

pktcMtaDevEvFirstTime OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The time that this entry was created."
    ::= { pktcMtaDevEventEntry 2 }

pktcMtaDevEvLastTime OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "If multiple events are reported via the same entry, the
             time that the last event for this entry occurred,
             otherwise this should have the same value as
             pktcMtaDevEvFirstTime. "
    ::= { pktcMtaDevEventEntry 3 }

pktcMtaDevEvCounts OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The number of consecutive event instances reported by
             this entry.  This starts at 1 with the creation of this
             row and increments by 1 for each subsequent duplicate event."
    ::= { pktcMtaDevEventEntry 4 }

pktcMtaDevEvLevel OBJECT-TYPE
    SYNTAX INTEGER {
            critical(1),
            major(2),
            minor(3),
            warning(4),
            information(5),
            notice(6),
            debug(7)
    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "The priority level of this event as defined by the
             vendor.  These are ordered from most serious (critical)
             to least serious (debug)."
    ::= { pktcMtaDevEventEntry 5 }

--
-- Vendors will provide their own enumerations for the following.
-- The interpretation of the enumeration is unambiguous for a
-- particular value of the vendor's enterprise number in sysObjectID.
--
```

```
pktcMtaDevEvId OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "For this product, uniquely identifies the type of event
             that is reported by this entry."
    ::= { pktcMtaDevEventEntry 6 }

pktcMtaDevEvText OBJECT-TYPE
    SYNTAX      DisplayString
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "Provides a human-readable description of the event,
             including all relevant context (interface numbers,
             etc.)."
    ::= { pktcMtaDevEventEntry 7 }

--
-- notification group is for future extension.
--

pktcMtaNotification OBJECT IDENTIFIER ::= { pktcMtaMib 2 0 }
pktcMtaConformance  OBJECT IDENTIFIER ::= { pktcMtaMib 3 }
pktcMtaCompliances  OBJECT IDENTIFIER ::= { pktcMtaConformance 1 }
pktcMtaGroups       OBJECT IDENTIFIER ::= { pktcMtaConformance 2 }

--
--    Notification Group
--

pktcMtaProvisioningEnrollment  NOTIFICATION-TYPE
    OBJECTS {
        pktcMtaDevHardwareVersion,
        docsDevSwCurrentVers,
        pktcMtaDevTypeIdentifier,
        pktcMtaDevMacAddress,
        pktcMtaDevCorrelationId,
        pktcMtaDevSignature
    }
    STATUS      current
    DESCRIPTION
            "This inform is issued to initiate the IPCablecom
process provisioning."
    REFERENCE
        "Inform as defined in RFC 1902"
    ::= { pktcMtaNotification 1 }

pktcMtaProvisioningStatus  NOTIFICATION-TYPE
    OBJECTS {
        pktcMtaDevMacAddress,
        pktcMtaDevCorrelationId,
        pktcMtaDevSignature,
        pktcMtaDevProvisioningState
    }
    STATUS      current
    DESCRIPTION
            "This inform is issued to confirm completion of the IPCablecom
provisioning process, and indicate the completion state."
    REFERENCE
        "Inform as defined in RFC 1902"
    ::= { pktcMtaNotification 2 }

-- compliance statements

pktcMtaBasicCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
            "The compliance statement for devices that implement
             MTA feature."
    MODULE    --pktcMtaMib

-- unconditionally mandatory groups

    MANDATORY-GROUPS {
            pktcMtaGroup
    }
```

```
-- units of conformance

OBJECT pktcMtaDevCorrelationId
    MIN-ACCESS read-only
    DESCRIPTION
            "not-accessible when request is SNMP get
             read-only when used in informs during provisioning."

OBJECT pktcMtaDevCertificate
    MIN-ACCESS  read-only
    DESCRIPTION
            "Read-write when request is through configuration file `
             download, otherwise it's a read-only object."

OBJECT pktcMtaDevTelephonyCertificate
    MIN-ACCESS  read-only
    DESCRIPTION
            "Read-write when request is through configuration file
             download, otherwise it's a read-only object."

OBJECT pktcMtaDevServProviderCertificate
    MIN-ACCESS  read-only
    DESCRIPTION
            "Read-write when request is through configuration file
             download, otherwise it's a read-only object."

OBJECT pktcMtaDevLocalSystemCertificate
    MIN-ACCESS  read-only
    DESCRIPTION
            "Read-write when request is through configuration file
             download, otherwise it's a read-only object."
OBJECT pktcMtaDevKerberosRealm
    MIN-ACCESS  read-only
    DESCRIPTION
            "Read-write when request is through configuration file
             download, otherwise it's a read-only object."

OBJECT pktcMtaDevTgsLocation
    MIN-ACCESS  read-only
    DESCRIPTION
            "Read-write when request is through configuration file
             download, otherwise it's a read-only object."
OBJECT pktcMtaDevKerbPrincipalName
    MIN-ACCESS  read-only
    DESCRIPTION
            "Read-write when request is through configuration file
             download, otherwise it's a read-only object."

OBJECT pktcMtaDevServGracePeriod
    MIN-ACCESS  read-only
    DESCRIPTION
            "Read-write when request is through configuration file
             download, otherwise it's a read-only object."
::= { pktcMtaCompliances 3 }
```

```
pktcMtaGroup OBJECT-GROUP
    OBJECTS {
        pktcMtaDevResetNow,
        pktcMtaDevSerialNumber,
        pktcMtaDevHardwareVersion,
        pktcMtaDevMacAddress,
        pktcMtaDevFQDN,
        pktcMtaDevEndPntCount,
        pktcMtaDevEnabled,
        pktcMtaDevTypeIdentifier,
        pktcMtaDevProvisioningState,
        pktcMtaDevCertificate,
        pktcMtaDevSignature,
        pktcMtaDevCorrelationId,
        pktcMtaDevManufacturerCertificate,
        pktcMtaDevTelephonyCertificate,
 pktcMtaDevServProviderCertificate,
 pktcMtaDevLocalSystemCertificate,
        pktcMtaDevKerberosRealm,
        pktcMtaDevTgsLocation,
        pktcMtaDevKerbPrincipalName,
        pktcMtaDevServGracePeriod,
        pktcMtaDevKeyMgmtTimeout1,
        pktcMtaDevKeyMgmtTimeout2,
        pktcMtaDevServerBootState,
        pktcMtaDevServerDhcp,
        pktcMtaDevSnmpEntity,
        pktcMtaDevEvControl,
        pktcMtaDevEvSyslog,
        pktcMtaDevEvThrottleAdminStatus,
        pktcMtaDevEvThrottleInhibited,
        pktcMtaDevEvThrottleThreshold,
        pktcMtaDevEvThrottleInterval,
        pktcMtaDevEvReporting,
        pktcMtaDevEvFirstTime,
        pktcMtaDevEvLastTime,
        pktcMtaDevEvCounts,
        pktcMtaDevEvLevel,
        pktcMtaDevEvId,
        pktcMtaDevEvText
    }
    STATUS    current
    DESCRIPTION
        "Group of objects for IPCablecom MTA MIB."
    ::= { pktcMtaGroups 1 }

END
```

Annex A (informative):
Bibliography

List of ITU-T Recommendations referring to IP Cablecom:

ETSI TS 101 909-2: "Architectural framework for the delivery of time critical services over cable Television networks using cable modems".

ITU-T Recommendation J.160: "Architectural framework for the delivery of time critical services over cable television networks using cable modems".

ITU-T Recommendation J.161: "Audio codec requirements for the provision of bi-directional audio service over cable television networks using cable modems".

ITU-T Recommendation J.162: "Network call signalling protocol for the delivery of time critical services over cable television networks using cable modems".

ITU-T Recommendation J.163: "Dynamic quality of service for the provision of real time services over cable television networks using cable modems".

ITU-T Recommendation J.164: "Event message requirements for the support of real-time services over cable television networks using cable modems".

ITU-T Recommendation J.165: "IPCablecom Internet Signalling Transport Protocol".

ITU-T Recommendation J.166: "IPCablecom management information base (MIB) framework".

ITU-T Recommendation J.167: "Media terminal adapter (MTA) device provisioning requirements for the delivery of real time services over cable television networks using cable modems".

ITU-T Recommendation J.168: "IPCablecom Media Terminal Adapter (MTA) MIB Requirements".

ITU-T Recommendation J.169: "IPCablecom Network Call Signalling (NCS) MIB Requirements".

ITU-T Recommendation J.170: "IPCablecom Security specification".

ITU-T Recommendation J.171: "IPCablecom Trunking Gateway Control Protocol (TGCP)".

History

Document history		
V1.1.1	June 2001	Publication