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Towards Definition of a Management Information Base for Multimedia Resources

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Status of this Memo

Abstract

This memo defines a MIB for use with managing multimedia resources. This generic term encompasses all resources that are designed to handle multimedia information, that is information made up of one or more information types such as text, video, speech, sound, graphics and animation. This MIB instruments attributes common to all multimedia resources, irrespective of their specific functionalities. Therefore, the MIB aims at defining a skeleton to be instantiated for any multimedia resource of interest.

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1. The Management Framework

The Internet-standard Management Framework consists of three components. They are:

STD 16, RFC 1155 [1] which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management. STD 16, RFC 1212 [2] defines a more concise description mechanism, which is wholly consistent with the SMI.

STD 17, RFC 1213 [3] which defines MIB-II, the core set of managed objects for the Internet suite of protocols.

STD 15, RFC 1157 [4] which defines the SNMP, the protocol used for network access to managed objects.

The Framework permits new objects to be defined for the purpose of experimentation and evaluation.

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Within a given MIB module, objects are defined using STD 16, RFC 1212's OBJECT-TYPE macro. At a minimum, each object has a name, a syntax, an access-level, and an implementation-status.

The name is an object identifier, an administratively assigned name, which specifies an object type. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the object descriptor, to also refer to the object type.

The syntax of an object type defines the abstract data structure corresponding to that object type. The ASN.1[5] language is used for this purpose. However, RFC 1155 purposely restricts the ASN.1 constructs which may be used. These restrictions are explicitly made for simplicity.

The access-level of an object type defines whether it makes "protocol sense" to read and/or write the value of an instance of the object type. (This access-level is independent of any administrative authorization policy.)

The implementation-status of an object type indicates whether the object is mandatory, optional, obsolete, or deprecated.

2. Multimedia Resources MIB

The Multimedia Resources MIB defines a uniform set of objects useful for the management of multimedia resources.
The proposed MIB is organized around four objects groups, namely the System group, the Service group, the Interface group and the Connection group. The first group mainly describes the resource's configuration and main features. Probably contained resources are registered in a table, thus expressing the resource configuration. In the Service group, objects relevant for the modelling and management of the global resource activities are captured. Those objects relate to the parameters which influence the resource's processing tasks. With respect to the Interface group, it mainly describes the flow passing through each resource port or interface. This group also shows statistics about each interface. Finally the Connection group is concerned with the correspondence between the input flows and the output ones, via their carrying interfaces. Therefore, this group is mainly made up of a table keeping track of the input flows and the changes these flows have been subject to.

3. Definitions

```
Multimedia-Resource-MIB DEFINITIONS ::= BEGIN

IMPORTS
   OBJECT-TYPE         FROM RFC-1212
   DisplayString,
   PhysAddress         FROM RFC1213-MIB
   TimeTicks,
   Counter, Gauge      FROM RFC1155-SMI
          ;

mmrMib            OBJECT IDENTIFIER ::= { mib-2 xx }

-- Textual conventions
-- Type definitions
-- The following defines any element status, multimedia resources status and
-- resource accesses status as well
ElementStatus ::=  INTEGER {
              unknown(1), -- element status cannot be determined
              running(2), -- element is processing some information
              ready(3),   -- ready to accept a new processing order
              not-ready(4),  -- not ready to accept a new processing order
              control(5),    -- element is in some control mode
              down(6),       -- element is down
              warning(7)     -- element notification
              }

-- The following defines the direction of the flow passing through a
-- resource access
FlowDirection ::= INTEGER {
              in(1),        -- access is carrying an incoming flow
              out(2)        -- access is carrying an outgoing flow
              }
```

```
-- The following defines flow directions supported by a resource access
SupportedDirections ::= INTEGER {
              in(1),         -- interface conveys only incoming flows
              out(2),        -- interface carries away only outgoing flows
              in-out(3)      -- interface can carry both incoming and
                             -- outgoing flows
              }

-- Definition of information types
MmrMedium ::=  INTEGER {
              other(1),
              audio(2),      -- both speech and sound
              text(3),
              graphics(4),
              picture(5),
              video(6),      -- moving pictures
              animation(7)   -- moving graphics
              }

-- Definition of media formats
MmrMediumFormat ::= INTEGER {
              other(1),
              video-PAL(2),
              video-SECAM(3),
              video-NTSC(4),
              composite-PAL(5),
              composite-SECAM(6),
              composite-NTSC(7)
              }

-- Definition of encoding types
MmrEncodType ::= INTEGER {
              other(1),        -- for anolog signals, for instance
              audio-a-PCM(2),  -- Pulse Coded Modulation, A-law (Europe)
              audio-mu-PCM(3), -- PCM, mu-law (North America)
              audio-MPEG1(4),
              audio-MPEG2(5),
              audio-MIDI(6),
              audio-WAVE(7),
              audio-MOD(8),
              audio-AIFF(9),
              audio-ULAW(10),
              text-ASCII(11),
              text-BIN(12),
              text-RTF(13),
              text-PS(14),
              text-DVI(15),
              text-EPS(16),
              text-DOC(17),
              text-MIF(18),
              picture-JPEG(19),
              picture-JBIG(20),  --Joint Bi-level Image expert Group
              picture-PICT(21),
              picture-GIF(22),
```

```
              picture-BMP(23),
              picture-TIFF(24),
              graphics-RAS(25),
              video-MJPEG(26),
              video-MPEG1(27),
              video-MPEG2(28),
              video-DVI(29),
              video-H-261(30),
              composite-MHEG(31) -- Multimedia and Hypermedia Expert Group
              -- Note that this sequence is not exhaustive at all,
              -- it may be completed by many other encoding types
              }

-- Definition of some usual encryption standards
EncryptionStandard ::= INTEGER {
              other(1),
              text-DES(2),               -- Data Encryption Standard
              composite-Nagravision(3),
              composite-Eurocrypt(4),
              composite-Syster(5),
              composite-Discret(6),
              composite-Videocypher2(7)
              -- Videocypher II+ is an encryption system used in the USA
              }

-- Description of groups composing the Multimedia Resources MIB
mmrSystem      OBJECT IDENTIFIER ::= { mmrMib 1 } -- system group
mmrService     OBJECT IDENTIFIER ::= { mmrMib 2 } -- service group
mmrInterface   OBJECT IDENTIFIER ::= { mmrMib 3 } -- interface group
mmrConnection  OBJECT IDENTIFIER ::= { mmrMib 4 } -- connection group

-- The Multimedia Resource System group
--
-- Implementation of this group is mandatory for all multimedia resources.
-- This group essentially describes the configuration of multimedia
-- resources and the parameters needed for administrative purposes.

mmrNumber   OBJECT-TYPE
  SYNTAX     INTEGER
  ACCESS     read-only
  STATUS     mandatory
  DESCRIPTION
       "The number of resources controlled through the same MIB (or agent).
        This value is the upper limit for mmrIndex."
  ::= { mmrSystem 1 }

mmrIDTable   OBJECT-TYPE
  SYNTAX     SEQUENCE OF MmrIDEntry
  ACCESS     not-accessible
  STATUS     mandatory
```

```
  DESCRIPTION
       " Table made up of the resources controlled through the same MIB, i.e.,
        resources inside the resource of interest. If the latter resource is
       considered as a `black box', so that the probable contained resources
        are not directly manageable, then this table is reduced to a single
        element (mmrNumber = 1)."
  ::= { mmrSystem 2 }

mmrIDEntry    OBJECT-TYPE
   SYNTAX      MmrIDEntry
   ACCESS      not-accessible
   STATUS      mandatory
   DESCRIPTION
        " Identifies a particular resource among those controlled through the
          same MIB."
   INDEX     { mmrIndex }
  ::= { mmrIDTable 1 }

MmrIDEntry ::=
              SEQUENCE {
              mmrIndex
                         INTEGER,
              mmrIDDescr
                         DisplayString,
              mmrObjectID
                         OBJECT IDENTIFIER,
              mmrUpTime
                         TimeTicks,
              mmrContact
                         DisplayString,
              mmrName
                         DisplayString,
              mmrLocation
                         DisplayString,
              mmrDriver
                         OBJECT IDENTIFIER
              }

mmrIndex      OBJECT-TYPE
  SYNTAX      INTEGER (1..65535)
  ACCESS      not-accessible
  STATUS      mandatory
  DESCRIPTION
        "Index assigned to the resource by the agent. Its upper limit is
        mmrNumber."
  ::= { mmrIDEntry 1 }

mmrIDDescr     OBJECT-TYPE
  SYNTAX     DisplayString (0..255)
  ACCESS     read-only
  STATUS     mandatory
  DESCRIPTION
        " Full description of some features of the resource, especially:
        - its eventual supporting hardware: device type, technology, some
```

```
        needful features...
        - the software (features of the offered Application Programming
        Interface (API), if any): operating system, programming language...
        Example is ...codec.MPEG2.UNIX.C."
  ::= { mmrIDEntry 2 }

mmrObjectID    OBJECT-TYPE
  SYNTAX     OBJECT IDENTIFIER
  ACCESS     read-only
  STATUS     mandatory
  DESCRIPTION
       " The vendor's authoritative identification of the resource management
       subsystem contained in the entity. This value is allocated within the
       SMI enterprises subtree and provides an easy and unambiguous means for
        determining `what kind of box' is being managed.
        Reference: RFC 1213 { system 2 }"
  ::= { mmrIDEntry 3 }

mmrUpTime      OBJECT-TYPE
  SYNTAX      TimeTicks
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "The time (in hundreds of a second) since the resource management
        subsystem was last re-initialized.
        Reference: RFC 1213 { system 3 } "
  ::= { mmrIDEntry 4 }

mmrContact     OBJECT-TYPE
  SYNTAX     DisplayString (SIZE (0..255))
  ACCESS     read-only
  STATUS     mandatory
  DESCRIPTION
        " Textual identification of the contact person for the managed
        resource, together with information on how to contact this person."
  ::= { mmrIDEntry 5 }

mmrName        OBJECT-TYPE
  SYNTAX      DisplayString (SIZE (0..255))
  ACCESS      read-write
  STATUS      mandatory
  DESCRIPTION
        " An administratively assigned name for this managed resource.
        Reference: RFC 1213 { system 5 }"
  ::= { mmrIDEntry 6 }

mmrLocation    OBJECT-TYPE
  SYNTAX      DisplayString (SIZE (0..255))
  ACCESS      read-write
  STATUS      mandatory
  DESCRIPTION
```

```
       " The physical location of the resource (e.g., `machine room, right,
        bottom corner'."
  ::= { mmrIDEntry 7 }

mmrDriver      OBJECT-TYPE
  SYNTAX      OBJECT IDENTIFIER
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " Description of the resource driver, mainly its version and its
       creator's subtree. Additional information may also be provided. If not
        present, this object should be set to OBJECT IDENTIFIER { 0 0 }."
  ::= { mmrIDEntry 8 }


-- The Multimedia Resource Service Group
--
-- Implementation of this group is mandatory for all multimedia resources.
-- In this group are described the parameters which are relevant for
-- controlling the resource's activities. These parameters may be readable,
-- assignable, accessible or not. They should fully highlight the degree of
-- liberty conferred to the manager and the flexibility offered by the
-- managed resource.

mmrOfferedServices      OBJECT-TYPE
  SYNTAX      DisplayString (SIZE (0..255))
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " Textual description of the services provided by the resource. For
        example, MPEG2 encoding, MPEG2 decoding, MPEG2 encoding/decoding,
        synchronization, multipoint issues (Multipoint Unit Control[8])..."
  ::= { mmrService 1 }

mmrStatus     OBJECT-TYPE
  SYNTAX      ElementStatus
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " Description of the resource's current status."
  ::= { mmrService 2 }

mmrErrors      OBJECT-TYPE
  SYNTAX      Counter
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " The number of errors detected on this device.
        Reference: RFC 1514 { hrDeviceEntry 6 } ."
  ::= { mmrService 3 }
```

```
mmrParamNumber  OBJECT-TYPE
  SYNTAX      INTEGER
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "The number of parameters relevant for the resource's activities."
  ::= { mmrService 4 }

mmrParamTable  OBJECT-TYPE
  SYNTAX      SEQUENCE OF MmrParameter
  ACCESS      not-accessible
  STATUS      mandatory
  DESCRIPTION
        "List of the parameters which are relevant for the resource's
        activities."
  ::= { mmrService 5 }

mmrParameter   OBJECT-TYPE
  SYNTAX      MmrParameter
  ACCESS      not-accessible
  STATUS      mandatory
  DESCRIPTION
        "Relevant parameter for the resource's activities."
  INDEX      { mmrParIndex }
  ::= { mmrParamTable 1 }

MmrParameter ::=
              SEQUENCE {
                  mmrParIndex
                            INTEGER,
                  mmrParDescr
                            DisplayString,
                  mmrOperValue
                            OBJECT IDENTIFIER,
                  mmrAdmValue
                            OBJECT IDENTIFIER,
                  mmrMaxValue
                            OBJECT IDENTIFIER
              }

mmrParIndex   OBJECT-TYPE
  SYNTAX     INTEGER
  ACCESS     not-accessible
  STATUS     mandatory
  DESCRIPTION
        "A unique index is assigned to each parameter from range 1 to
        mmrParamNumber."
  ::= { mmrParameter 1 }

mmrParDescr   OBJECT-TYPE
  SYNTAX     DisplayString (SIZE (0..255) )
  ACCESS     read-only
```

```
  STATUS      mandatory
  DESCRIPTION
        "Textual string giving information about the parameter and its
        influence on the resource activities."
::= { mmrParameter 2 }

mmrOperValue   OBJECT-TYPE
  SYNTAX      OBJECT IDENTIFIER
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "Current value of the parameter. The object syntax depends on the
        parameter description."
  ::= { mmrParameter 3 }

mmrAdmValue   OBJECT-TYPE
  SYNTAX     OBJECT IDENTIFIER
  ACCESS     read-write
  STATUS     mandatory
  DESCRIPTION
       " Value to be assigned to the parameter. The object syntax is the same
        as that of mmrOperValue. In some cases, the parameter may not be
       modifiable; mmrAdmValue should then be set to OBJECT IDENTIFIER { 0 0
        }."
  ::= { mmrParameter 4 }

mmrMaxValue   OBJECT-TYPE
  SYNTAX      OBJECT IDENTIFIER
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
         "Upper limit value for the parameter. The object syntax is the same
          as that of mmrOperValue."
  ::= { mmrParameter 5 }


-- The multimedia resource Interface group
--
-- Implementation of this group is mandatory.
-- This group describes resources interfaces. One specificity of multimedia
-- resources is that ports representing their interfaces can support either
-- digital or analog information. Some features of flows passing through
-- those interfaces are also described in this group , such as the used
-- encryption standard, media types, encoding types, etc.

mmrInterfaceNumber   OBJECT-TYPE
  SYNTAX      INTEGER
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "The number of interfaces, or ports, exhibited by the resource."
  ::= { mmrInterface 1 }
```

```
mmrInterfTable     OBJECT-TYPE
  SYNTAX      SEQUENCE OF MmrEntry
  ACCESS      not-accessible
  STATUS      mandatory
  DESCRIPTION
        "List of interface entries. The total number of entries is
        mmrInterfaceNumber."
  ::= { mmrInterface 2 }

mmrEntry      OBJECT-TYPE
  SYNTAX      MmrEntry
  ACCESS      not-accessible
  STATUS      mandatory
  DESCRIPTION
        "Interface entry, contains objects useful for managing the entry."
  INDEX   { mmrInterfIndex }
  ::= { mmrInterfTable 1 }

MmrEntry ::=
         SEQUENCE {
              mmrInterfIndex   -- interface index within the interface table
                        INTEGER,
              mmrInterfDescr   -- textual description of this interface
                        DisplayString,
              mmInterfPhysAddr -- physical address of this interface
                        PhysAddress,
              mmrInterfNature  -- interface nature, analog or digital?
                        INTEGER,
              mmrInterfMaxSpeed -- maximum speed acceptable at this interface
                        Gauge,
              mmrInterfOperSpeed -- current speed of this interface
                        Gauge,
              mmrInterfSpeedIncr  -- speed increment for an additional flow
                        Gauge,
              mmrInterfAdmStats   -- desired status of this interface
                        ElementStatus,
              mmrInterfOperStats  -- current operational status
                        ElementStatus,
              mmrInterfLastChange     -- last re-initialization time of
                                     -- this interface
                        TimeTicks,
              mmrSuppFlowDirect
                        SupportedDirections,
              mmrInterfOperFlowDirection   -- direction of the current flow
                        FlowDirection,
              mmrAdmFlowDirection          -- desired flow direction
                        FlowDirection,
              mmrInterfSuppMedia          -- sequence of the supported media
                        SEQUENCE OF MmrMedium,
              mmrInterfSuppFormats         -- supported formats
                        SEQUENCE OF MmrMediumFormat,
              mmrInterfSuppEncodTypes      -- supported encoding types
                        SEQUENCE OF MmrEncodType,
```

```
              mmrInterfSuppEncryption     -- supported encryption standards
                        SEQUENCE OF EncryptionStandard,
              mmrInterfOperMedia  -- current media passing through the
                                  --interface
                        SEQUENCE OF MmrMedium,
              mmrInterfOperFormats                -- currently used formats
                        SEQUENCE OF MmrMediumFormat,
              mmrInterfOperEncodTypes       -- currently used encoding types
                        SEQUENCE OF MmrEncodType,
              mmrInterfOperEncryption -- currently used encryption standards
                        SEQUENCE OF EncryptionStandard,
              mmrInterfUnKnownMedia   -- number of received data units whose
                              -- related media are unknown to this interface
                        Counter,
              mmrInterfUnKnownFormats  -- number of received data units
                              -- whose formats are unknown to this interface
                        Counter,
              mmrInterfUnKnownEncod       -- number of received data units
                         -- whose coding types are unknown to this interface
                        Counter,
              mmrInterfUnKnownEncrypt  -- number of received data units whose
                        -- encryption standards are unknown to this interface
                        Counter,
              mmrInterfErrors          -- number of errors at this interface
                        Counter,
              mmrInterfSpecific
                        OBJECT IDENTIFIER
              }

mmrInterfIndex      OBJECT-TYPE
  SYNTAX      INTEGER
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "A unique index is assigned to each interface from range 1 to
        mmrInterfNumber."
  ::= { mmrEntry 1 }

mmrInterfDescr     OBJECT-TYPE
  SYNTAX      DisplayString (SIZE (0..255))
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "Textual string giving information about the interface, e.g., the
        manufacturer, the product name, the hardware version."
  ::= { mmrEntry 2 }

mmrInterfPhysAddr     OBJECT-TYPE
  SYNTAX      PhysAddress
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
       "Interface's physical address. This address relates to a protocol or
        a functional (or administrative) addressing plan."
```

```
   ::= { mmrEntry 3 }

mmrInterfNature      OBJECT-TYPE
  SYNTAX      INTEGER {               -- interface processes
                  analog(1),          -- only analog information
                  digital(2),         -- only digital information
                  both(3)             -- both information natures
              }
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "Specifies the nature of the flow to be handled by the interface."
  ::= { mmrEntry 4 }

mmrInterfMaxSpeed      OBJECT-TYPE
  SYNTAX      Gauge
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " Maximum interface bandwidth, in bits per second if the interface
        nature is digital, and in kHz otherwise."
  ::= { mmrEntry 5 }

mmrInterfOperSpeed      OBJECT-TYPE
  SYNTAX      Gauge
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " Estimate of the interface's current bandwidth in the same unit as
        that of mmrInterfMaxSpeed."
  ::= { mmrEntry 6 }

mmrInterfSpeedIncr      OBJECT-TYPE
  SYNTAX      Gauge
  ACCESS      read-write
  STATUS      mandatory
  DESCRIPTION
       " The bandwidth increment to be added to the current for processing a
       new flow. The unit is the same as that of mmrInterfMaxSpeed. Once the
        allocation has been granted, mmrInterfSpeedIncr is set to zero."
  ::= { mmrEntry 7 }

mmrInterfAdmStats      OBJECT-TYPE
  SYNTAX      ElementStatus
  ACCESS      read-write
  STATUS      mandatory
  DESCRIPTION
       "The desired state of the interface. The control state indicates that
        some interruption is being performed and that no data processing is
        possible."
  ::= { mmrEntry 8 }
```

```
mmrInterfOperStats      OBJECT-TYPE
  SYNTAX      ElementStatus
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "The current operational state of the interface. The control state
       indicates that some interruption is being performed and that no data
        processing is possible."
  ::= { mmrEntry 9 }

mmrInterfLastChange       OBJECT-TYPE
  SYNTAX      TimeTicks
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
      "The value of mmrUpTime at the time the interface entered its current
        operational state."
  ::= { mmrEntry 10 }

mmrSuppFlowDirect      OBJECT-TYPE
  SYNTAX      SupportedDirections
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " Flow directions supported by the interface."
  ::= { mmrEntry 11 }

mmrOperFlowDirection       OBJECT-TYPE
  SYNTAX      FlowDirection
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
      " The direction of the current flow. This latter may be destinated to
      or originated by the resource. Initially, mmrOperFlowDirection should
        be set to the most suitable value of mmrSuppFlowDirect."
  ::= { mmrEntry 12 }

mmrAdmFlowDirection      OBJECT-TYPE
  SYNTAX      FlowDirection
  ACCESS      read-write
  STATUS      mandatory
  DESCRIPTION
      " The direction of the assigned flow. This latter may be destinated to
      or originated by the resource."
  ::= { mmrEntry 13 }

mmrInterfSuppMedia       OBJECT-TYPE
  SYNTAX      SEQUENCE OF MmrMedium
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "Sequence of the supported media."
```

```
  ::= { mmrEntry 14 }

mmrInterfSuppFormats       OBJECT-TYPE
  SYNTAX      SEQUENCE OF MmrMediumFormat
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "Sequence of the supported media formats."
  ::= { mmrEntry 15 }

mmrInterfSuppEncodTypes      OBJECT-TYPE
  SYNTAX      SEQUENCE OF MmrEncodType
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "Sequence of the supported media encoding types."
  ::= { mmrEntry 16 }

mmrInterfSuppEncryption      OBJECT-TYPE
  SYNTAX      SEQUENCE OF EncryptionStandard
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " List of the supported encryption standards."
  ::= { mmrEntry 17 }

mmrInterfOperMedia       OBJECT-TYPE
  SYNTAX      SEQUENCE OF MmrMedium
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " Sequence of the media passing through the interface. Therefore,
        composite signals are considered as well as native signals."
  ::= { mmrEntry 18 }

mmrInterfOperFormats        OBJECT-TYPE
  SYNTAX      SEQUENCE OF MmrMediumFormat
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " List of the formats corresponding to the media contained in the
        current flow."
  ::= { mmrEntry 19 }

mmrInterfOperEncodTypes       OBJECT-TYPE
  SYNTAX      SEQUENCE OF MmrEncodType
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " Sequence of the encoding types used by the passing flow."
::= { mmrEntry 20 }

mmrInterfOperEncryption       OBJECT-TYPE
```

```
  SYNTAX      SEQUENCE OF EncryptionStandard
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " Sequence of the current encryption types."
  ::= {mmrEntry 21 }

mmrInterfUnKnownMedia     OBJECT-TYPE
  SYNTAX      Counter
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "The number of data units discarded, because their underlying media
        are unknown from the interface."
  ::= { mmrEntry 22 }

mmrInterfUnKnownFormats       OBJECT-TYPE
  SYNTAX      Counter
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "The number of data units discarded, because their underlying media
        formats are unknown from the interface."
  ::= { mmrEntry 23 }

mmrInterfUnKnownEncod     OBJECT-TYPE
  SYNTAX      Counter
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "The number of data units discarded, because their underlying media
        encoding types are unknown from the interface."
  ::= { mmrEntry 24 }

mmrInterfUnKnownEncrypt OBJECT-TYPE
  SYNTAX      Counter
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "The number of data units discarded, because their underlying media
        encryption standards are unknown from the interface."
  ::= { mmrEntry 25 }

mmrInterfErrors        OBJECT-TYPE
  SYNTAX      Counter
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        "The number of errored data units received at the interface."
  ::= { mmrEntry 26 }

mmrInterfSpecific     OBJECT-TYPE
  SYNTAX      OBJECT IDENTIFIER
```

```
  ACCESS     read-only
  STATUS     mandatory
  DESCRIPTION
       " Specificities of the resource may put additional relevant features
        to those studied above. The present object represents those
        specificities. If no particularities are worth the mention,
        mmrInterfSpecific must be set to OBJECT IDENTIFIER { 0 0 }"
  ::= { mmrEntry 27 }


-- The multimedia resource Connection group
--
-- Implementation of this group is mandatory.
-- This group describes the on-going flow processings inside the resource.
-- Each flow processing is depicted as "path" (mmrConnectEntry) linking two
-- interfaces: a source interface and a sink interface.

mmrConnectTable          OBJECT-TYPE
  SYNTAX      SEQUENCE OF MmrConnectEntry
  ACCESS      not-accessible
  STATUS      mandatory
  DESCRIPTION
        " Mapping table between input and output flows, considering their
        associated addresses. The number of rows is limited to
        mmrInterfaceNumber^2. This number considers multicasting options."
  ::= { mmrConnection 1 }

mmrConnectEntry        OBJECT-TYPE
  SYNTAX      MmrConnectEntry
  ACCESS      not-accessible
  STATUS      mandatory
  DESCRIPTION
        " Indication of the output address(es) or sinks related to an input
        flow."
  INDEX      { mmrConnectIndex }
  ::= { mmrConnectTable 1 }

MmrConnectEntry   ::=
              SEQUENCE {
                   mmrConnectIndex
                            INTEGER,
                   mmrIfSrcAddr
                            PhysAddress,
                   mmrIfSinkAddr
                            PhysAddress,
                   mmrTrafficProfile
                            INTEGER,
                   mmrConnectErrors
                            Counter,
                   mmrConnectDelay
                            TimeTicks,
                   mmrConnectSpec
                            OBJECT IDENTIFIER
              }
```

```
mmrConnectIndex       OBJECT-TYPE
  SYNTAX      INTEGER
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " A unique index is assigned to each entry, from range 1 to
        mmrInterfaceNumber^2."
  ::= { mmrConnectEntry 1 }

mmrIfSrcAddr   OBJECT-TYPE
  SYNTAX      PhysAddress
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " The source address of the connection. This object relates to a
        resource interface. Also, together with mmrIfSinkAddr, mmrIfSrcAddr
        provides information about the flow carried away by the connection."
  ::= { mmrConnectEntry 2 }

mmrIfSinkAddr OBJECT-TYPE
  SYNTAX      PhysAddress
  ACCESS      read-write
  STATUS      mandatory
  DESCRIPTION
        " The sink address of the connection."
  ::= { mmrConnectEntry 3 }

mmrTrafficProfile  OBJECT-TYPE
  SYNTAX      INTEGER {
                   constant(1),
                   variable(2)
              }
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
       " Profile of the traffic carried by the connection. This traffic may
        be either constant or variable."
  ::= { mmrConnectEntry 4 }

mmrConnectErrors  OBJECT-TYPE
  SYNTAX      Counter
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " Number of errors occurred during the connection time. The textual
        meaning of this number depends on the resource and the requirements
        associated. For example this number may be expressed in number of
        errored bits per second."
  ::= { mmrConnectEntry 5 }
```

```
mmrConnectDelay  OBJECT-TYPE
  SYNTAX      TimeTicks
  ACCESS      read-only
  STATUS      mandatory
  DESCRIPTION
        " The average duration taken by the flow to cross the connection."
  ::= { mmrConnectEntry 6 }

mmrConnectSpec    OBJECT-TYPE
  SYNTAX      OBJECT IDENTIFIER
  ACCESS      read-write
  STATUS      mandatory
  DESCRIPTION
       " Connection specificities with respect to the considered multimedia
        resource."
  ::= { mmrConnectEntry 7 }

END
```

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7. Security Considerations
Security issues are not discussed in this memo.

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