            Radio Frequency (RF) Interface Management Information Base
                   for MCNS/DOCSIS compliant RF interfaces

Status of this Memo

   This document specifies an Internet standards track protocol for the
   Internet community, and requests discussion and suggestions for
   improvements. Please refer to the current edition of the "Internet
   Official Protocol Standards" (STD 1) for the standardization state
   and status of this protocol. Distribution of this memo is unlimited.

Abstract

   This memo defines a portion of the Management Information Base (MIB)
   for use with network management protocols in the Internet community.
   In particular, it defines a basic set of managed objects for SNMP-
   based management of MCNS/DOCSIS compliant Radio Frequency (RF)
   interfaces.

   This memo specifies a MIB module in a manner that is compliant to the
   SNMP SMIv2 [5][6][7]. The set of objects are consistent with the
   SNMP framework and existing SNMP standards.

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

 Table of Contents

1. The SNMP Management Framework

   The SNMP Management Framework presently consists of five major
   components:

   o   An overall architecture, described in RFC 2571 [1].

   o   Mechanisms for describing and naming objects and events for the
        purpose of management. The first version of this Structure of
        Management Information (SMI) is called SMIv1 and described in STD
        16, RFC 1155 [2], STD 16, RFC 1212 [3] and RFC 1215 [4]. The
        second version, called SMIv2, is described in STD 58, RFC 2578
        [5], STD 58, RFC 2579 [6] and STD 58, RFC 2580 [7].

   o   Message protocols for transferring management information. The
        first version of the SNMP message protocol is called SNMPv1 and
        described in RFC 1157 [8]. A second version of the SNMP message
        protocol, which is not an Internet standards track protocol, is
        called SNMPv2c and described in RFC 1901 [9] and RFC 1906 [10].
        The third version of the message protocol is called SNMPv3 and
        described in RFC 1906 [10], RFC 2572 [11] and RFC 2574 [12].

   o   Protocol operations for accessing management information. The
        first set of protocol operations and associated PDU formats is
        described in STD 15, RFC 1157 [8]. A second set of protocol
        operations and associated PDU formats is described in RFC 1905
        [13].

   o   A set of fundamental applications described in RFC 2573 [14] and
        the view-based access control mechanism described in RFC 2575
        [15].

   Managed objects are accessed via a virtual information store, termed
   the Management Information Base or MIB. Objects in the MIB are
   defined using the mechanisms defined in the SMI.

   This memo specifies a MIB module that is compliant to the SMIv2. A
   MIB conforming to the SMIv1 can be produced through the appropriate
   translations. The resulting translated MIB MUST be semantically
   equivalent, except where objects or events are omitted because no
   translation is possible (use of Counter64). Some machine readable
   information in SMIv2 will be converted into textual descriptions in
   SMIv1 during the translation process. However, this loss of machine
   readable information is not considered to change the semantics of the
   MIB.

2. Glossary

   The terms in this document are derived either from normal cable
   system usage, or from the documents associated with the Data Over
   Cable Service Interface Specification process.

2.1. CATV

   Originally "Community Antenna Television", now used to refer to any
   cable or hybrid fiber and cable system used to deliver video signals
   to a community.

2.2. Channel

   A specific frequency allocation with an RF medium, specified by
   channel width in Hertz (cycles per second) and by center frequency.
   Within the US Cable Systems, upstream channels are generally
   allocated from the 5-42MHz range while down stream channels are
   generally allocated from the 50-750MHz range depending on the
   capabilities of the given system. The typical broadcast channel
   width in the US is 6MHz. Upstream channel widths for DOCSIS vary.

2.3. CM   Cable Modem.

   A CM acts as a "slave" station in a DOCSIS compliant cable data
   system.

2.4. CMTS   Cable Modem Termination System.

   A generic term covering a cable bridge or cable router in a head-end.
   A CMTS acts as the master station in a DOCSIS compliant cable data
   system. It is the only station that transmits downstream, and it
   controls the scheduling of upstream transmissions by its associated
   CMs.

2.5. Codeword

   See [16]. A characteristic of the Foward Error Correction scheme used
   above the RF media layer.

2.6. Data Packet

   The payload portion of the MAC Packet.

2.7. dBmV

   Decibel relative to one milli-volt. A measure of RF power.

2.8. DOCSIS

   "Data Over Cable Interface Specification". A term referring to the
   ITU-T J.112 Annex B standard for cable modem systems [20].

2.9. Downstream

   The direction from the head-end towards the subscriber.

2.10. Head-end

   The origination point in most cable systems of the subscriber video
   signals.

2.11. MAC Packet

   A DOCSIS PDU.

2.12. MCNS

   "Multimedia Cable Network System". Generally replaced in usage by
   DOCSIS.

2.13. Mini-slot

   See [16]. In general, an interval of time which is allocated by the
   CMTS to a given CM for that CM to transmit in an upstream direction.

2.14. QPSK   Quadrature Phase Shift Keying.

   A particular modulation scheme on an RF medium. See [19].

2.15. QAM   Quadrature Amplitude Modulation.

   A particular modulation scheme on on RF medium. Usually expressed
   with a number indicating the size of the modulation constellation
   (e.g. 16 QAM). See [19], or any other book on digital communications
   over RF for a complete explanation of this.

2.16. RF

   Radio Frequency.

2.17. Symbol-times

   See [16]. A characteristic of the RF modulation scheme.

2.18. Upstream

   The direction from the subscriber towards the head-end.

3. Overview

   This MIB provides a set of objects required for the management of
   MCNS/DOCSIS compliant Cable Modem (CM) and Cable Modem Termination
   System (CMTS) RF interfaces. The specification is derived in part
   from the parameters and protocols described in DOCSIS Radio Frequency
   Interface Specification [16].

3.1. Structure of the MIB

   This MIB is structured as three groups:

   o   Management information pertinent to both Cable Modems (CM) and
          Cable Modem Termination Systems (CMTS) (docsIfBaseObjects).

   o   Management information pertinent to Cable Modems only
          (docsIfCmObjects).

   o   Management information pertinent to Cable Modem Termination
          Systems only (docsIfCmtsObjects).

   Tables within each of these groups group objects functionally - e.g.
   Quality of Service, Channel characteristics, MAC layer management,
   etc. Rows created automatically (e.g. by the device according to the
   hardware configuration) may and generally will have a mixture of
   configuration and status objects within them. Rows that are meant to
   be created by the management station are generally restricted to
   configuration (read-create) objects.

3.1.1. docsIfBaseObjects

   docsIfDownstreamChannelTable - This table describes the active
   downstream channels for a CMTS and the received downstream channel
   for a CM.

   docsIfUpstreamChannelTable - This table describes the active upstream
   channels for a a CMTS and the current upstream transmission channel
   for a CM.

   docsIfQosProfileTable - This table describes the valid Quality of
   Service service profiles for the cable data system.

   docsIfSignalQualityTable - This table is used to monitor RF signal
   quality characteristics of received signals.

3.1.2. docsIfCmObjects

docsIfCmMacTable - This table is used to monitor the DOCSIS MAC
interface and can be considered an extension to the ifEntry.

docsIfCmServiceTable - This table describes the upstream service
queues available at this CM. There is a comparable table at the
CMTS, docsIfCmtsServiceEntry, which describes the service queues from
the point of view of the CMTS.

3.1.3. docsIfCmtsObjects

docsIfCmtsStatusTable - This table provides a set of aggregated
counters which roll-up values and events that occur on the underlying
sub-interfaces.

docsIfCmtsCmStatusTable - This table is used to hold information
about known (e.g. registered) cable modems on the system serviced by
this CMTS.

docsIfCmtsServiceEntry - This table provides access to the
information related to upstream service queues.

docsIfCmtsModulationTable - This table allows control over the
modulation profiles for RF channels associated with this CMTS.

docsIfCmtsMacToCmTable - This table allows fast access into the
docsIfCmtsCmTable via a MAC address (of the CM) interface.

3.2. Relationship to the Interfaces MIB

This section clarifies the relationship of this MIB to the Interfaces
MIB [17]. Several areas of correlation are addressed in the
following subsections. The implementor is referred to the Interfaces
MIB document in order to understand the general intent of these
areas.

3.2.1. Layering Model

An instance of ifEntry exists for each RF Downstream interface, for
each RF Upstream interface, and for each RF MAC layer. The
ifStackTable [17] MUST be implemented to identify relationships among
sub-interfaces.

The following example illustrates a MAC interface with one downstream
and two upstream channels.

```
                             | <== to network layer
            +-------------+--------------+
            |           RF MAC           |
            +----+---------+-----------+-+
                 |         |           |
        +--------+---+ +---+-------+ +-+---------+
        | Downstream1 | | Upstream1 | | Upstream2 |
        +------------+ +-----------+ +-----------+
```
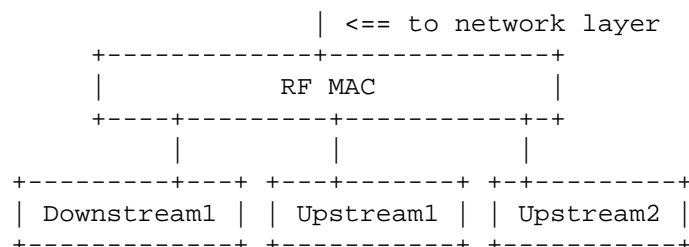
As can be seen from this example, the RF MAC interface is layered on
top of the downstream and upstream interfaces.

In this example, the assignment of index values could be as follows:

```
    ifIndex ifType                  Description

    1    docsCableMaclayer(127)   CATV MAC Layer
    2    docsCableDownstream(128) CATV Downstream interface
    3    docsCableUpstream(129)   CATV Upstream interface
    4    docsCableUpstream(129)   CATV Upstream interface
```

The corresponding ifStack entries would then be:

IfStackHigherLayer	ifStackLowerLayer
0	1
1	2
1	3
1	4
2	0
3	0
4	0

The same interface model can also be used in Telephony or Telco
Return systems. A pure Telco Return system (Cable Modem as well as
Cable Modem Termination System) would not have upstream, but only
downstream cable channels. Systems supporting both Telco Return and
cable upstream channels can use the above model without modification.

Telco Return Upstream channel(s) are handled by the appropriate MIBs,
such as PPP or Modem MIBs.

3.2.2. Virtual Circuits

This medium does not support virtual circuits and this area is not
applicable to this MIB.

3.2.3. ifTestTable

   The ifTestTable is not supported by this MIB.

3.2.4. ifRcvAddressTable

   The ifRcvAddressTable is not supported by this MIB.

3.2.5. ifEntry

   This section documents only the differences from the requirements
   specified in the Interfaces MIB. See that MIB for columns omitted
   from the descriptions below.

3.2.5.1. ifEntry for Downstream interfaces

   The ifEntry for Downstream interfaces supports the
   ifGeneralInformationGroup and the ifPacketGroup of the Interfaces
   MIB. This is an output only interface at the CMTS and all input
   status counters - ifIn* - will return zero. This is an input only
   interface at the CM and all output status counters - ifOut* - will
   return zero.

3.2.5.1.1. ifEntry for Downstream interfaces in Cable Modem Termination
            Systems

   ifTable   Comments
   =============   ===
   ifIndex   Each RF Cable Downstream interface is represented
                     by an ifEntry.

   ifType   The IANA value of docsCableDownstream(128).

   ifSpeed   Return the speed of this downstream channel.
                     The returned value the raw bandwidth in bits/s
                     of this interface. This is the symbol rate
                     multiplied with the number of bits per symbol.

   ifPhysAddress   Return an empty string.

   ifAdminStatus   The administrative status of this interface.

   ifOperStatus   The current operational status of this interface.

   ifMtu   The size of the largest frame which can be
                     sent on this interface, specified in octets.
                     The value includes the length of the MAC header.

    ifInOctets   Return zero.

    ifInUcastPkts   Return zero.

    ifInMulticastPkts Return zero.

    ifInBroadcastPkts Return zero.

    ifInDiscards   Return zero.

    ifInErrors   Return zero.

    ifInUnknownProtos Return zero.

    ifOutOctets   The total number of octets transmitted on this
                       interface. This includes MAC packets as well as
                       data packets, and includes the length of the MAC
                       header.

    ifOutUcastPkts   The number of Unicast packets transmitted on this
                       interface. This includes MAC packets as well as
                       data packets.

    ifOutMulticastPkts
                       Return the number of Multicast packets transmitted
                       on this interface.
                       This includes MAC packets as well as data packets.

    ifOutBroadcastPkts
                       Return the number of broadcast packets transmitted
                       on this interface.
                       This includes MAC packets as well as data packets.

    ifOutDiscards   The total number of outbound packets which
                       were discarded. Possible reasons are:
                       buffer shortage.

    ifOutErrors   The number of packets which could not be
                       transmitted due to errors.

    ifPromiscuousMode Return false.

3.2.5.1.2. ifEntry for Downstream interfaces in Cable Modems

```
   ifTable           Comments
   =============     ==========================================
   ifIndex           Each RF Cable Downstream interface is represented
                     by an ifEntry.

   ifType            The IANA value of docsCableDownstream(128).

   ifSpeed           Return the speed of this downstream channel.
                     The returned value the raw bandwidth in bits/s
                     of this interface. This is the symbol rate
                     multiplied with the number of bits per symbol.

   ifPhysAddress     Return an empty string.

   ifAdminStatus     The administrative status of this interface.

   ifOperStatus      The current operational status of this interface.

   ifMtu             The size of the largest frame which can be
                     received from this interface, specified in octets.
                     The value includes the length of the MAC header.

   ifInOctets        The total number of octets received on this
                     interface. This includes data packets as well as
                     MAC layer packets, and includes the length of the
                     MAC header.

   ifInUcastPkts     The number of Unicast packets received on this
                     interface. This includes data packets as well as
                     MAC layer packets.

   ifInMulticastPkts Return the number of Multicast packets received
                     on this interface. This includes data packets as
                     well as MAC layer packets.

   ifInBroadcastPkts Return the number of Broadcast packets received
                     on this interface. This includes data packets
                     as well as MAC layer packets.

   ifInDiscards      The total number of received packets which have
                     been discarded.
                     The possible reasons are: buffer shortage.

   ifInErrors        The number of inbound packets that contained
                     errors preventing them from being deliverable
                     to higher layers.
```

                          Possible reasons are: MAC FCS error.

    ifInUnknownProtos The number of frames with an unknown packet type.
                      These are MAC frames with an unknown packet type.

    ifOutOctets   Return zero.

    ifOutUcastPkts   Return zero.

    ifOutMulticastPkts
                      Return zero.

    ifOutBroadcastPkts
                      Return zero.

    ifOutDiscards   Return zero.

    ifOutErrors   Return zero.

    ifPromiscuousMode Refer to the Interfaces MIB.

3.2.5.2. ifEntry for Upstream interfaces

   The ifEntry for Upstream interfaces supports the
   ifGeneralInformationGroup and the ifPacketGroup of the Interfaces
   MIB. This is an input only interface at the CMTS and all output
   status counters - ifOut* - will return zero. This is an output only
   interface at the CM and all input status counters - ifIn* - will
   return zero.

3.2.5.2.1. ifEntry for Upstream interfaces in Cable Modem Termination
            Systems

    ifTable   Comments
    =============   ===
    ifIndex   Each RF Cable Upstream interface is represented
                      by an ifEntry.

    ifType   The IANA value of docsCableUpstream(129).

    ifSpeed   Return the speed of this upstream channel.
                      The returned value is the raw bandwidth
                      in bits/s of this interface, regarding the
                      highest speed modulation profile that is
                      defined. This is the symbol rate multiplied
                      with the number of bits per symbol for this
                      modulation profile.

    ifPhysAddress   Return an empty string.

    ifAdminStatus   The administrative status of this interface.

    ifOperStatus   The current operational status of this interface.

    ifMtu   The size of the largest frame which can be
                      received on this interface, specified in octets.
                      The value includes the length of the MAC header.

    ifInOctets   The total number of octets received on this
                      interface. This includes data packets as well as
                      MAC layer packets, and includes the length of the
                      MAC header.

    ifInUcastPkts   The number of Unicast packets received on this
                      interface. This includes data packets as well as
                      MAC layer packets.

    ifInMulticastPkts Return the number of Multicast packets received
                      on this interface. This includes data packets as
                      well as MAC layer packets.

    ifInBroadcastPkts Return the number of Broadcast packets received
                      on this interface. This includes data packets
                      as well as MAC layer packets.

    ifInDiscards   The total number of received packets which have
                      been discarded.
                      The possible reasons are: buffer shortage.

    ifInErrors   The number of inbound packets that contained
                      errors preventing them from being deliverable
                      to higher layers.
                      Possible reasons are: MAC FCS error.

    ifInUnknownProtos The number of frames with an unknown packet type.
                      This are MAC frames with an unknown packet type.

    ifOutOctets   Return zero.

    ifOutUcastPkts   Return zero.

    ifOutMulticastPkts
                      Return zero.

    ifOutBroadcastPkts
                      Return zero.

```
   ifOutDiscards     Return zero.

   ifOutErrors       Return zero.
```

3.2.5.2.2. ifEntry for Upstream interfaces in Cable Modems

```
   ifTable           Comments
   ==============    ==========================================
   ifIndex           Each RF Cable Upstream interface is represented
                     by an ifEntry.

   ifType            The IANA value of docsCableUpstream(129).

   ifSpeed           Return the speed of this upstream channel.
                     The returned value is the raw bandwidth
                     in bits/s of this interface, regarding the
                     highest speed modulation profile that is
                     defined. This is the symbol rate multiplied
                     with the number of bits per symbol for this
                     modulation profile.

   ifPhysAddress     Return an empty string.

   ifAdminStatus     The administrative status of this interface.

   ifOperStatus      The current operational status of this interface.

   ifMtu             The size of the largest frame which can be
                     transmitted on this interface, specified in octets.
                     The value includes the length of the MAC header.

   ifInOctets        Return zero.

   ifInUcastPkts     Return zero.

   ifInMulticastPkts Return zero.

   ifInBroadcastPkts Return zero.

   ifInDiscards      Return zero.

   ifInErrors        Return zero.

   ifInUnknownProtos Return zero.
```

    ifOutOctets   The total number of octets transmitted on this
                       interface. This includes MAC packets as well as
                       data packets, and includes the length of the MAC
                       header.

    ifOutUcastPkts   The number of Unicast packets transmitted on this
                       interface. This includes MAC packets as well as
                       data packets.

    ifOutMulticastPkts
                       Return the number of Multicast packets transmitted
                       on this interface.
                       This includes MAC packets as well as data packets.

    ifOutBroadcastPkts
                       Return the number of broadcast packets transmitted
                       on this interface.
                       This includes MAC packets as well as data packets.

    ifOutDiscards   The total number of outbound packets which
                       were discarded. Possible reasons are:
                       buffer shortage.

    ifOutErrors   The number of packets which could not be
                       transmitted due to errors.

    ifPromiscuousMode Return false.

3.2.5.3. ifEntry for the MAC Layer

   The ifEntry for the MAC Layer supports the ifGeneralInformationGroup
   and the ifPacketGroup of the Interfaces MIB. This interface provides
   an aggregate view of status for the lower level Downstream and
   Upstream interfaces.

    ifTable   Comments
    =============   ==
    ifIndex   Each RF Cable MAC layer entity is represented
                       by an ifEntry.

    ifType   The IANA value of docsCableMaclayer(127).

    ifSpeed   Return zero.

    ifPhysAddress   Return the physical address of this interface.

    ifAdminStatus   The administrative status of this interface.

ifOperStatus   The current operational status of the MAC
                   layer interface.

ifHighSpeed   Return zero.

ifMtu   Return 1500.

ifInOctets   The total number of data octets received on this
                   interface, targeted for upper protocol layers.

ifInUcastPkts   The number of Unicast packets received on this
                   interface, targeted for upper protocol layers.

ifInMulticastPkts Return the number of Multicast packets received
                   on this interface, targeted for upper protocol
                   layers.

ifInBroadcastPkts Return the number of Broadcast packets received
                   on this interface, targeted for upper protocol
                   layers.

ifInDiscards   The total number of received packets which have
                   been discarded.
                   The possible reasons are: buffer shortage.

ifInErrors   The number of inbound packets that contained
                   errors preventing them from being deliverable
                   to higher layers.
                   Possible reasons are: data packet FCS error,
                   invalid MAC header.

ifInUnknownProtos The number of frames with an unknown packet type.
                   This is the number of data packets targeted for
                   upper protocol layers with an unknown packet type.

ifOutOctets   The total number of octets, received from upper
                   protocol layers and transmitted on this interface.

ifOutUcastPkts   The number of Unicast packets, received from upper
                   protocol layers and transmitted on this interface.

ifOutMulticastPkts
                   Return the number of Multicast packets received
                   from upper protocol layers and transmitted on this
                   interface.

       ifOutBroadcastPkts
                      Return the number of broadcast packets received
                      from upper protocol layers and transmitted on this
                      interface.

       ifOutDiscards   The total number of outbound packets which
                         were discarded. Possible reasons are:
                         buffer shortage.

       ifOutErrors   The number of packets which could not be
                         transmitted due to errors.

       ifPromiscuousMode Refer to the Interfaces MIB.

4. Definitions

DOCS-IF-MIB DEFINITIONS ::= BEGIN

   IMPORTS
         MODULE-IDENTITY,
         OBJECT-TYPE,
   -- do not import   BITS,
         Unsigned32,
         Integer32,
         Counter32,
         TimeTicks,
         IpAddress,
         transmission
                 FROM SNMPv2-SMI
         TEXTUAL-CONVENTION,
         MacAddress,
         RowStatus,
         TruthValue,
         TimeInterval,
         TimeStamp
                 FROM SNMPv2-TC
         OBJECT-GROUP,

         MODULE-COMPLIANCE
                 FROM SNMPv2-CONF
         ifIndex, InterfaceIndexOrZero
                 FROM IF-MIB;

docsIfMib MODULE-IDENTITY
         LAST-UPDATED   "9908190000Z" -- August 19, 1999
         ORGANIZATION   "IETF IPCDN Working Group"
         CONTACT-INFO
             "   Michael StJohns
               Postal: @Home Network
                       425 Broadway
                       Redwood City, CA
                       U.S.A.
               Phone: +1 650 569 5368
               E-mail: stjohns@corp.home.net"
         DESCRIPTION
             "This is the MIB Module for MCNS/DOCSIS compliant Radio
              Frequency (RF) interfaces in Cable Modems (CM) and
              Cable Modem Termination Systems (CMTS)."
         REVISION "9908190000Z"
         DESCRIPTION
             "Initial Version, published as RFC 2670.
              Modified by Mike StJohns to fix problems identified by

            the first pass of the MIB doctor. Of special note,
            docsIfRangingResp and docsIfCmtsInsertionInterval were
            obsoleted and replaced by other objects with the same
            functionality, but more appropriate SYNTAX."
        ::= { transmission 127 }

-- Textual Conventions

TenthdBmV ::= TEXTUAL-CONVENTION
        DISPLAY-HINT "d-1"
        STATUS   current
        DESCRIPTION
           "This data type represents power levels that are normally
            expressed in dBmV. Units are in tenths of a dBmV;
            for example, 5.1 dBmV will be represented as 51."
        SYNTAX   Integer32

TenthdB ::= TEXTUAL-CONVENTION
        DISPLAY-HINT "d-1"
        STATUS   current
        DESCRIPTION
           "This data type represents power levels that are normally
            expressed in dB. Units are in tenths of a dB;
            for example, 5.1 dB will be represented as 51."
        SYNTAX   Integer32

docsIfMibObjects OBJECT IDENTIFIER ::= { docsIfMib 1 }
docsIfBaseObjects OBJECT IDENTIFIER ::= { docsIfMibObjects 1 }
docsIfCmObjects   OBJECT IDENTIFIER ::= { docsIfMibObjects 2 }
docsIfCmtsObjects OBJECT IDENTIFIER ::= { docsIfMibObjects 3 }

--
-- BASE GROUP
--

--
-- The following table is implemented on both the Cable Modem (CM)
-- and the Cable Modem Termination System (CMTS).
--

docsIfDownstreamChannelTable OBJECT-TYPE
        SYNTAX   SEQUENCE OF DocsIfDownstreamChannelEntry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
           "This table describes the attributes of downstream
            channels (frequency bands)."
        REFERENCE

```
              "DOCSIS Radio Frequency Interface Specification,
               Table 4-12 and Table 4-13."
          ::= { docsIfBaseObjects 1 }


docsIfDownstreamChannelEntry OBJECT-TYPE
          SYNTAX       DocsIfDownstreamChannelEntry
          MAX-ACCESS   not-accessible
          STATUS       current
          DESCRIPTION
              "An entry provides a list of attributes for a single
               Downstream channel.
               An entry in this table exists for each ifEntry with an
               ifType of docsCableDownstream(128)."
          INDEX { ifIndex }
          ::= { docsIfDownstreamChannelTable 1 }


DocsIfDownstreamChannelEntry ::= SEQUENCE {
          docsIfDownChannelId                Integer32,
          docsIfDownChannelFrequency         Integer32,
          docsIfDownChannelWidth             Integer32,
          docsIfDownChannelModulation        INTEGER,
          docsIfDownChannelInterleave        INTEGER,
          docsIfDownChannelPower             TenthdBmV
          }


docsIfDownChannelId OBJECT-TYPE
          SYNTAX       Integer32 (0..255)
          MAX-ACCESS   read-only
          STATUS       current
          DESCRIPTION
              "The Cable Modem Termination System (CMTS) identification
               of the downstream channel within this particular MAC
               interface. If the interface is down, the object returns
               the most current value. If the downstream channel ID is
               unknown, this object returns a value of 0."
          ::= { docsIfDownstreamChannelEntry 1 }


docsIfDownChannelFrequency  OBJECT-TYPE
          SYNTAX       Integer32 (0..1000000000)
          UNITS        "hertz"
          MAX-ACCESS   read-write
          STATUS       current
          DESCRIPTION
              "The center of the downstream frequency associated with
               this channel. This object will return the current tuner
               frequency. If a CMTS provides IF output, this object
               will return 0, unless this CMTS is in control of the
               final downstream RF frequency.  See the associated
```

            compliance object for a description of valid frequencies
            that may be written to this object."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Section 4.3.3."
        ::= { docsIfDownstreamChannelEntry 2 }

docsIfDownChannelWidth OBJECT-TYPE
        SYNTAX   Integer32 (0..16000000)
        UNITS   "hertz"
        MAX-ACCESS   read-write
        STATUS   current
        DESCRIPTION
            "The bandwidth of this downstream channel. Most
             implementations are expected to support a channel width
             of 6 MHz (North America) and/or 8 MHz (Europe). See the
             associated compliance object for a description of the
             valid channel widths for this object."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Table 4-12 and Table 4-13."
        ::= { docsIfDownstreamChannelEntry 3 }

docsIfDownChannelModulation OBJECT-TYPE
        SYNTAX   INTEGER {
            unknown(1),
            other(2),
            qam64(3),
            qam256(4)
        }
        MAX-ACCESS   read-write
        STATUS   current
        DESCRIPTION
            "The modulation type associated with this downstream
             channel. If the interface is down, this object either
             returns the configured value (CMTS), the most current
             value (CM), or the value of unknown(1). See the
             associated conformance object for write conditions and
             limitations. See the reference for specifics on the
             modulation profiles implied by qam64 and qam256."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Section 3.6.2."
        ::= { docsIfDownstreamChannelEntry 4 }

docsIfDownChannelInterleave OBJECT-TYPE
        SYNTAX   INTEGER {
            unknown(1),

```
            other(2),
            taps8Increment16(3),
            taps16Increment8(4),
            taps32Increment4(5),
            taps64Increment2(6),
            taps128Increment1(7)
        }
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "The Forward Error Correction (FEC) interleaving used
             for this downstream channel.
             Values are defined as follows:
             taps8Increment16(3):  protection 5.9/4.1 usec,
                                   latency .22/.15 msec
             taps16Increment8(4):  protection 12/8.2 usec,
                                   latency .48/.33 msec
             taps32Increment4(5):  protection 24/16 usec,
                                   latency .98/.68 msec
             taps64Increment2(6):  protection 47/33 usec,
                                   latency 2/1.4 msec
             taps128Increment1(7): protection 95/66 usec,
                                   latency 4/2.8 msec
             If the interface is down, this object either returns
             the configured value (CMTS), the most current value (CM),
             or the value of unknown(1).
             The value of other(2) is returned if the interleave
             is known but not defined in the above list.
             See the associated conformance object for write
             conditions and limitations. See the reference for the FEC
             configuration described by the setting of this object."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Section 4.3.2."
        ::= { docsIfDownstreamChannelEntry 5 }

docsIfDownChannelPower OBJECT-TYPE
        SYNTAX      TenthdBmV
        UNITS       "dBmV"
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "At the CMTS, the operational transmit power. At the CM,
             the received power level. May be set to zero at the CM
             if power level measurement is not supported.
             If the interface is down, this object either returns
             the configured value (CMTS), the most current value (CM)
             or the value of 0. See the associated conformance object
```

```
        for write conditions and limitations. See the reference
        for recommended and required power levels."
     REFERENCE
        "DOCSIS Radio Frequency Interface Specification,
        Table 4-12 and Table 4-13."
     ::= { docsIfDownstreamChannelEntry 6 }

--
-- The following table is implemented on both the CM and the CMTS.
-- For the CM, only attached channels appear in the table.  For the
-- CM, this table is read only as well.
--

docsIfUpstreamChannelTable OBJECT-TYPE
     SYNTAX        SEQUENCE OF DocsIfUpstreamChannelEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
        "This table describes the attributes of attached upstream
        channels (frequency bands)."
     ::= { docsIfBaseObjects 2 }

docsIfUpstreamChannelEntry OBJECT-TYPE
     SYNTAX        DocsIfUpstreamChannelEntry
     MAX-ACCESS    not-accessible
     STATUS        current
     DESCRIPTION
        "List of attributes for a single upstream channel.
        An entry in this table exists for each ifEntry with an
        ifType of docsCableUpstream(129)."
     INDEX { ifIndex }
     ::= { docsIfUpstreamChannelTable 1 }

DocsIfUpstreamChannelEntry ::= SEQUENCE {
        docsIfUpChannelId                   Integer32,
        docsIfUpChannelFrequency            Integer32,
        docsIfUpChannelWidth                Integer32,
        docsIfUpChannelModulationProfile    Unsigned32,
        docsIfUpChannelSlotSize             Unsigned32,
        docsIfUpChannelTxTimingOffset       Unsigned32,
        docsIfUpChannelRangingBackoffStart  Integer32,
        docsIfUpChannelRangingBackoffEnd    Integer32,
        docsIfUpChannelTxBackoffStart       Integer32,
        docsIfUpChannelTxBackoffEnd         Integer32
        }

docsIfUpChannelId OBJECT-TYPE
     SYNTAX        Integer32 (0..255)
```

```
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The CMTS identification of the upstream channel."
        ::= { docsIfUpstreamChannelEntry 1 }

docsIfUpChannelFrequency OBJECT-TYPE
        SYNTAX      Integer32 (0..1000000000)
        UNITS       "hertz"
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "The center of the frequency band associated with this
             upstream channel. This object returns 0 if the frequency
             is undefined or unknown. Minimum permitted upstream
             frequency is 5,000,000 Hz for current technology.  See
             the associated conformance object for write conditions
             and limitations."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Table 2-2."
        ::= { docsIfUpstreamChannelEntry 2 }

docsIfUpChannelWidth OBJECT-TYPE
        SYNTAX      Integer32 (0..20000000)
        UNITS       "hertz"
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "The bandwidth of this upstream channel. This object
             returns 0 if the channel width is undefined or unknown.
             Minimum permitted channel width is 200,000 Hz currently.
             See the associated conformance object for write conditions
             and limitations."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Table 4-3."
        ::= { docsIfUpstreamChannelEntry 3 }

docsIfUpChannelModulationProfile OBJECT-TYPE
        SYNTAX      Unsigned32
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "An entry identical to the docsIfModIndex in the
             docsIfCmtsModulationTable that describes this channel.
             This channel is further instantiated there by a grouping
             of interval usage codes which together fully describe the
```

```
             channel modulation. This object returns 0 if the
             docsIfCmtsModulationTable entry does not exist or
             docsIfCmtsModulationTable is empty. See
             the associated conformance object for write conditions
             and limitations."
        ::= { docsIfUpstreamChannelEntry 4 }

docsIfUpChannelSlotSize OBJECT-TYPE
        SYNTAX       Unsigned32
        MAX-ACCESS   read-write
        STATUS       current
        DESCRIPTION
            "The number of 6.25 microsecond ticks in each upstream mini-
             slot. Returns zero if the value is undefined or unknown.
             See the associated conformance object for write
             conditions and limitations."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Section 6.1.2.4."
        ::= { docsIfUpstreamChannelEntry 5 }

docsIfUpChannelTxTimingOffset OBJECT-TYPE
        SYNTAX       Unsigned32
        MAX-ACCESS   read-only
        STATUS       current
        DESCRIPTION
            "A measure of the current round trip time at the CM, or the
             maximum round trip time seen by the CMTS.  Used for timing
             of CM upstream transmissions to ensure synchronized
             arrivals at the CMTS. Units are in terms of
             (6.25 microseconds/64)."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Section 6.5."
        ::= { docsIfUpstreamChannelEntry 6 }

docsIfUpChannelRangingBackoffStart OBJECT-TYPE
        SYNTAX       Integer32 (0..16)
        MAX-ACCESS   read-write
        STATUS       current
        DESCRIPTION
            "The initial random backoff window to use when retrying
             Ranging Requests. Expressed as a power of 2. A value of 16
             at the CMTS indicates that a proprietary adaptive retry
             mechanism is to be used. See the associated conformance
             object for write conditions and limitations."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
```

                 Section 6.4.4."
         ::= { docsIfUpstreamChannelEntry 7 }

docsIfUpChannelRangingBackoffEnd OBJECT-TYPE
         SYNTAX   Integer32 (0..16)
         MAX-ACCESS   read-write
         STATUS   current
         DESCRIPTION
             "The final random backoff window to use when retrying
              Ranging Requests. Expressed as a power of 2. A value of 16
              at the CMTS indicates that a proprietary adaptive retry
              mechanism is to be used. See the associated conformance
              object for write conditions and limitations."
         REFERENCE
             "DOCSIS Radio Frequency Interface Specification,
              Section 6.4.4."
         ::= { docsIfUpstreamChannelEntry 8 }

docsIfUpChannelTxBackoffStart OBJECT-TYPE
         SYNTAX   Integer32 (0..16)
         MAX-ACCESS   read-write
         STATUS   current
         DESCRIPTION
             "The initial random backoff window to use when retrying
              transmissions. Expressed as a power of 2. A value of 16
              at the CMTS indicates that a proprietary adaptive retry
              mechanism is to be used. See the associated conformance
              object for write conditions and limitations."
         REFERENCE
             "DOCSIS Radio Frequency Interface Specification,
              Section 6.4.4."
         ::= { docsIfUpstreamChannelEntry 9 }

docsIfUpChannelTxBackoffEnd OBJECT-TYPE
         SYNTAX   Integer32 (0..16)
         MAX-ACCESS   read-write
         STATUS   current
         DESCRIPTION
             "The final random backoff window to use when retrying
              transmissions. Expressed as a power of 2. A value of 16
              at the CMTS indicates that a proprietary adaptive retry
              mechanism is to be used. See the associated conformance
              object for write conditions and limitations."
         REFERENCE
             "DOCSIS Radio Frequency Interface Specification,
              Section 6.4.4."
         ::= { docsIfUpstreamChannelEntry 10 }

```
-- The following table describes the attributes of each class of
-- service.  The entries in this table are referenced from the
-- docsIfServiceEntries.  They exist as a separate table in order to
-- reduce redundant information in docsIfServiceTable.
--
-- This table is implemented at both the CM and the CMTS.
-- The CM need only maintain entries for the classes of service
-- referenced by its docsIfServiceTable.
--


docsIfQosProfileTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF DocsIfQosProfileEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Describes the attributes for each class of service."
        ::= { docsIfBaseObjects 3 }

docsIfQosProfileEntry OBJECT-TYPE
        SYNTAX      DocsIfQosProfileEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Describes the attributes for a single class of service.

             If implemented as read-create in the Cable Modem
             Termination System, creation of entries in this table is
             controlled by the value of docsIfCmtsQosProfilePermissions.

             If implemented as read-only, entries are created based
             on information in REG-REQ MAC messages received from
             Cable Modems (Cable Modem Termination System
             implementation), or based on information extracted from
             the TFTP option file (Cable Modem implementation).
             In the Cable Modem Termination system, read-only entries
             are removed if no longer referenced by
             docsIfCmtsServiceTable.

             An entry in this table must not be removed while it is
             referenced by an entry in docsIfCmServiceTable (Cable Modem)
             or docsIfCmtsServiceTable (Cable Modem Termination System).

             An entry in this table should not be changeable while
             it is referenced by an entry in docsIfCmtsServiceTable.

             If this table is created automatically, there should only
             be a single entry for each Class of Service. Multiple
             entries with the same Class of Service parameters are not
```

```
                      recommended."
              INDEX { docsIfQosProfIndex }
              ::= { docsIfQosProfileTable 1 }


DocsIfQosProfileEntry ::= SEQUENCE {
              docsIfQosProfIndex              Integer32,
              docsIfQosProfPriority           Integer32,
              docsIfQosProfMaxUpBandwidth     Integer32,
              docsIfQosProfGuarUpBandwidth    Integer32,
              docsIfQosProfMaxDownBandwidth   Integer32,
              docsIfQosProfMaxTxBurst         Integer32,
              docsIfQosProfBaselinePrivacy    TruthValue,
              docsIfQosProfStatus             RowStatus
              }


docsIfQosProfIndex OBJECT-TYPE
          SYNTAX      Integer32 (1..16383)
          MAX-ACCESS  not-accessible
          STATUS      current
          DESCRIPTION
             "The index value which uniquely identifies an entry
              in the docsIfQosProfileTable."
          ::= { docsIfQosProfileEntry 1 }


docsIfQosProfPriority  OBJECT-TYPE
          SYNTAX      Integer32 (0..7)
          MAX-ACCESS  read-create
          STATUS      current
          DESCRIPTION
             "A relative priority assigned to this service when
              allocating bandwidth. Zero indicates lowest priority;
              and seven indicates highest priority.
              Interpretation of priority is device-specific.
              MUST NOT be changed while this row is active."
          DEFVAL { 0 }
          ::= { docsIfQosProfileEntry 2 }


docsIfQosProfMaxUpBandwidth OBJECT-TYPE
          SYNTAX      Integer32 (0..100000000)
          MAX-ACCESS  read-create
          STATUS      current
          DESCRIPTION
             "The maximum upstream bandwidth, in bits per second,
              allowed for a service with this service class.
              Zero if there is no restriction of upstream bandwidth.
              MUST NOT be changed while this row is active."
          DEFVAL { 0 }
          ::= { docsIfQosProfileEntry 3 }
```

docsIfQosProfGuarUpBandwidth OBJECT-TYPE
        SYNTAX   Integer32 (0..100000000)
        MAX-ACCESS   read-create
        STATUS   current
        DESCRIPTION
            "Minimum guaranteed upstream bandwidth, in bits per second,
             allowed for a service with this service class.
             MUST NOT be changed while this row is active."
        DEFVAL { 0 }
        ::= { docsIfQosProfileEntry 4 }

docsIfQosProfMaxDownBandwidth OBJECT-TYPE
        SYNTAX   Integer32 (0..100000000)
        MAX-ACCESS   read-create
        STATUS   current
        DESCRIPTION
            "The maximum downstream bandwidth, in bits per second,
             allowed for a service with this service class.
             Zero if there is no restriction of downstream bandwidth.
             MUST NOT be changed while this row is active."
        DEFVAL { 0 }
        ::= { docsIfQosProfileEntry 5 }

docsIfQosProfMaxTxBurst OBJECT-TYPE
        SYNTAX   Integer32 (0..255)
        MAX-ACCESS   read-create
        STATUS   current
        DESCRIPTION
            "The maximum number of mini-slots that may be requested
             for a single upstream transmission.
             A value of zero means there is no limit.
             MUST NOT be changed while this row is active."
        DEFVAL { 0 }
        ::= { docsIfQosProfileEntry 6 }

docsIfQosProfBaselinePrivacy OBJECT-TYPE
        SYNTAX   TruthValue
        MAX-ACCESS   read-create
        STATUS   current
        DESCRIPTION
            "Indicates whether Baseline Privacy is enabled for this
             service class.
             MUST NOT be changed while this row is active."
        DEFVAL { false }
        ::= { docsIfQosProfileEntry 7 }

docsIfQosProfStatus OBJECT-TYPE
        SYNTAX   RowStatus

          MAX-ACCESS read-create
          STATUS   current
          DESCRIPTION
              "This is object is to used to create or delete rows in
               this table. This object MUST NOT be changed from active
               while the row is referenced by the any entry in either
               docsIfCmServiceTable (on the CM), or the
               docsIfCmtsServiceTable (on the CMTS)."
          ::= { docsIfQosProfileEntry 8 }

docsIfSignalQualityTable OBJECT-TYPE
          SYNTAX   SEQUENCE OF DocsIfSignalQualityEntry
          MAX-ACCESS not-accessible
          STATUS   current
          DESCRIPTION
              "At the CM, describes the PHY signal quality of downstream
               channels. At the CMTS, describes the PHY signal quality of
               upstream channels. At the CMTS, this table may exclude
               contention intervals."
          ::= { docsIfBaseObjects 4 }

docsIfSignalQualityEntry OBJECT-TYPE
          SYNTAX   DocsIfSignalQualityEntry
          MAX-ACCESS not-accessible
          STATUS   current
          DESCRIPTION
              "At the CM, describes the PHY characteristics of a
               downstream channel. At the CMTS, describes the PHY signal
               quality of an upstream channel.
               An entry in this table exists for each ifEntry with an
               ifType of docsCableUpstream(129) for Cable Modem Termination
               Systems and docsCableDownstream(128) for Cable Modems."
          INDEX { ifIndex }
          ::= { docsIfSignalQualityTable 1 }

DocsIfSignalQualityEntry ::= SEQUENCE {
          docsIfSigQIncludesContention TruthValue,
          docsIfSigQUnerroreds   Counter32,
          docsIfSigQCorrecteds   Counter32,
          docsIfSigQUncorrectables   Counter32,
          docsIfSigQSignalNoise   TenthdB,
          docsIfSigQMicroreflections   Integer32,
          docsIfSigQEqualizationData   OCTET STRING
          }

docsIfSigQIncludesContention OBJECT-TYPE
          SYNTAX   TruthValue

```
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "true(1) if this CMTS includes contention intervals in
             the counters in this table. Always false(2) for CMs."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 6.4.4"
        ::= { docsIfSignalQualityEntry 1 }

docsIfSigQUnerroreds OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Codewords received on this channel without error.
             This includes all codewords, whether or not they
             were part of frames destined for this device."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 4.2.3 and 4.3.6"
        ::= { docsIfSignalQualityEntry 2 }

docsIfSigQCorrecteds OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Codewords received on this channel with correctable
             errors. This includes all codewords, whether or not
             they were part of frames destined for this device."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 4.2.3 and 4.3.6"
        ::= { docsIfSignalQualityEntry 3 }

docsIfSigQUncorrectables OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Codewords received on this channel with uncorrectable
             errors. This includes all codewords, whether or not
             they were part of frames destined for this device."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 4.2.3 and 4.3.6"
        ::= { docsIfSignalQualityEntry 4 }
```

docsIfSigQSignalNoise OBJECT-TYPE
        SYNTAX   TenthdB
        UNITS   "dB"
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "Signal/Noise ratio as perceived for this channel.
             At the CM, describes the Signal/Noise of the downstream
             channel. At the CMTS, describes the average Signal/Noise
             of the upstream channel."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Table 2-1 and 2-2"
        ::= { docsIfSignalQualityEntry 5 }

docsIfSigQMicroreflections OBJECT-TYPE
        SYNTAX   Integer32 (0..255)
        UNITS   "dBc"
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "Total microreflections including in-channel response
             as perceived on this interface, measured in dBc below
             the signal level.
             This object is not assumed to return an absolutely
             accurate value, but should give a rough indication
             of microreflections received on this interface.
             It is up to the implementor to provide information
             as accurate as possible."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Table 2-1 and 2-2"
        ::= { docsIfSignalQualityEntry 6 }

docsIfSigQEqualizationData OBJECT-TYPE
        SYNTAX   OCTET STRING
        MAX-ACCESS   read-only
        STATUS   current
        DESCRIPTION
            "At the CM, returns the equalization data for the downstream
             channel. At the CMTS, returns the average equalization
             data for the upstream channel. Returns an empty string
             if the value is unknown or if there is no equalization
             data available or defined."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Figure 6-23."
        ::= { docsIfSignalQualityEntry 7 }

```
--
-- CABLE MODEM GROUP
--


-- #######


--
-- The CM MAC Table
--

docsIfCmMacTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF DocsIfCmMacEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Describes the attributes of each CM MAC interface,
             extending the information available from ifEntry."
        ::= { docsIfCmObjects 1 }

docsIfCmMacEntry OBJECT-TYPE
        SYNTAX      DocsIfCmMacEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "An entry containing objects describing attributes of
             each MAC entry, extending the information in ifEntry.
             An entry in this table exists for each ifEntry with an
             ifType of docsCableMaclayer(127)."
        INDEX { ifIndex }
        ::= { docsIfCmMacTable 1 }

DocsIfCmMacEntry ::= SEQUENCE {
        docsIfCmCmtsAddress         MacAddress,
        docsIfCmCapabilities        BITS,
        docsIfCmRangingRespTimeout  TimeTicks,
        docsIfCmRangingTimeout      TimeInterval
        }

docsIfCmCmtsAddress OBJECT-TYPE
        SYNTAX      MacAddress
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Identifies the CMTS that is believed to control this MAC
             domain. At the CM, this will be the source address from
             SYNC, MAP, and other MAC-layer messages. If the CMTS is
             unknown, returns 00-00-00-00-00-00."
        ::= { docsIfCmMacEntry 1 }
```

```
docsIfCmCapabilities OBJECT-TYPE
        SYNTAX      BITS {
            atmCells(0),
            concatenation(1)
        }
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Identifies the capabilities of the MAC implementation
             at this interface. Note that packet transmission is
             always supported. Therefore, there is no specific bit
             required to explicitly indicate this capability."
        ::= { docsIfCmMacEntry 2 }

-- This object has been obsoleted and replaced by
-- docsIfCmRangingTimeout to correct the typing to TimeInterval. New
-- implementations of the MIB should use docsIfCmRangingTimeout instead.

docsIfCmRangingRespTimeout OBJECT-TYPE
        SYNTAX      TimeTicks
        MAX-ACCESS  read-write
        STATUS      obsolete
        DESCRIPTION
            "Waiting time for a Ranging Response packet."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Figure 7-6 and 7-7, timer T3."
        DEFVAL { 20 }
        ::= { docsIfCmMacEntry 3 }

docsIfCmRangingTimeout OBJECT-TYPE
        SYNTAX      TimeInterval
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "Waiting time for a Ranging Response packet."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Figure 7-6 and 7-7, timer T3."
        DEFVAL { 20 }
        ::= { docsIfCmMacEntry 4 }

--
-- CM status table.
-- This table is implemented only at the CM.
--

docsIfCmStatusTable OBJECT-TYPE
```

```
        SYNTAX      SEQUENCE OF DocsIfCmStatusEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "This table maintains a number of status objects
             and counters for Cable Modems."
        ::= { docsIfCmObjects 2 }

docsIfCmStatusEntry OBJECT-TYPE
        SYNTAX      DocsIfCmStatusEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "A set of status objects and counters for a single MAC
             layer instance in a Cable Modem.
             An entry in this table exists for each ifEntry with an
             ifType of docsCableMaclayer(127)."
        INDEX { ifIndex }
        ::= { docsIfCmStatusTable 1 }

DocsIfCmStatusEntry ::= SEQUENCE {
        docsIfCmStatusValue                 INTEGER,
        docsIfCmStatusCode                  OCTET STRING,
        docsIfCmStatusTxPower               TenthdBmV,
        docsIfCmStatusResets                Counter32,
        docsIfCmStatusLostSyncs             Counter32,
        docsIfCmStatusInvalidMaps           Counter32,
        docsIfCmStatusInvalidUcds           Counter32,
--         docsIfCmStatusInvalidRangingResp      Counter32,
        docsIfCmStatusInvalidRangingResponses   Counter32,
--         docsIfCmStatusInvalidRegistrationResp   Counter32,
        docsIfCmStatusInvalidRegistrationResponses Counter32,
        docsIfCmStatusT1Timeouts            Counter32,
        docsIfCmStatusT2Timeouts            Counter32,
        docsIfCmStatusT3Timeouts            Counter32,
        docsIfCmStatusT4Timeouts            Counter32,
        docsIfCmStatusRangingAborteds       Counter32
        }

docsIfCmStatusValue OBJECT-TYPE
        SYNTAX      INTEGER {
            other(1),
            notReady(2),
            notSynchronized(3),
            phySynchronized(4),
            usParametersAcquired(5),
            rangingComplete(6),
            ipComplete(7),
```

```
            todEstablished(8),
            securityEstablished(9),
            paramTransferComplete(10),
            registrationComplete(11),
            operational(12),
            accessDenied(13)
        }
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Current Cable Modem connectivity state, as specified
             in the RF Interface Specification."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Chapter 7.2."
        ::= { docsIfCmStatusEntry 1 }

docsIfCmStatusCode OBJECT-TYPE
        SYNTAX      OCTET STRING
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Status code for this Cable Modem as defined in the
             RF Interface Specification. The status code consists
             of a single character indicating error groups, followed
             by a two- or three-digit number indicating the status
             condition."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Cable Modem status codes."
        ::= { docsIfCmStatusEntry 2 }

docsIfCmStatusTxPower OBJECT-TYPE
        SYNTAX      TenthdBmV
        UNITS       "dBmV"
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The operational transmit power for the attached upstream
             channel."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 4.2.8."
        ::= { docsIfCmStatusEntry 3 }

docsIfCmStatusResets OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
```

```
        STATUS      current
        DESCRIPTION
            "Number of times the CM reset or initialized
             this interface."
        ::= { docsIfCmStatusEntry 4 }

docsIfCmStatusLostSyncs OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Number of times the CM lost synchronization with
             the downstream channel."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 6.5."
        ::= { docsIfCmStatusEntry 5 }

docsIfCmStatusInvalidMaps OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Number of times the CM received invalid MAP messages."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 6.3.2.3 and 6.4.2."
        ::= { docsIfCmStatusEntry 6 }

docsIfCmStatusInvalidUcds OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Number of times the CM received invalid UCD messages."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 6.3.2.2."
        ::= { docsIfCmStatusEntry 7 }

-- docsIfCmStatusInvalidRangingResp replaced for Counter32
-- naming requirements

docsIfCmStatusInvalidRangingResponses OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
```

```
               "Number of times the CM received invalid ranging response
                messages."
           ::= { docsIfCmStatusEntry 8 }


-- docsIfCmStatusInvalidRegistrationResp replaced for
-- Counter32 naming requirements
docsIfCmStatusInvalidRegistrationResponses OBJECT-TYPE
           SYNTAX       Counter32
           MAX-ACCESS   read-only
           STATUS       current
           DESCRIPTION
               "Number of times the CM received invalid registration
                response messages."
           ::= { docsIfCmStatusEntry 9 }


docsIfCmStatusT1Timeouts OBJECT-TYPE
           SYNTAX       Counter32
           MAX-ACCESS   read-only
           STATUS       current
           DESCRIPTION
               "Number of times counter T1 expired in the CM."
           REFERENCE
               "DOCSIS Radio Frequency Interface specification,
                Figure 7-3."
           ::= { docsIfCmStatusEntry 10 }


docsIfCmStatusT2Timeouts OBJECT-TYPE
           SYNTAX       Counter32
           MAX-ACCESS   read-only
           STATUS       current
           DESCRIPTION
               "Number of times counter T2 expired in the CM."
           REFERENCE
               "DOCSIS Radio Frequency Interface specification,
                Figure 7-6."
           ::= { docsIfCmStatusEntry 11 }


docsIfCmStatusT3Timeouts OBJECT-TYPE
           SYNTAX       Counter32
           MAX-ACCESS   read-only
           STATUS       current
           DESCRIPTION
               "Number of times counter T3 expired in the CM."
           REFERENCE
               "DOCSIS Radio Frequency Interface specification,
                Figure 7-6 and 7-7."
           ::= { docsIfCmStatusEntry 12 }
```

docsIfCmStatusT4Timeouts OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "Number of times counter T4 expired in the CM."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Figure 7-7."
        ::= { docsIfCmStatusEntry 13 }

docsIfCmStatusRangingAborteds OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "Number of times the ranging process was aborted
             by the CMTS."
        ::= { docsIfCmStatusEntry 14 }

--
-- The Cable Modem Service Table
--

docsIfCmServiceTable OBJECT-TYPE
        SYNTAX   SEQUENCE OF DocsIfCmServiceEntry
        MAX-ACCESS not-accessible
        STATUS   current
        DESCRIPTION
            "Describes the attributes of each upstream service queue
             on a CM."
        ::= { docsIfCmObjects 3 }

docsIfCmServiceEntry OBJECT-TYPE
        SYNTAX   DocsIfCmServiceEntry
        MAX-ACCESS not-accessible
        STATUS   current
        DESCRIPTION
            "Describes the attributes of an upstream bandwidth service
             queue.
             An entry in this table exists for each Service ID.
             The primary index is an ifIndex with an ifType of
             docsCableMaclayer(127)."
        INDEX { ifIndex, docsIfCmServiceId }
        ::= { docsIfCmServiceTable 1 }

DocsIfCmServiceEntry ::= SEQUENCE {
        docsIfCmServiceId   Integer32,

```
            docsIfCmServiceQosProfile       Integer32,
            docsIfCmServiceTxSlotsImmed      Counter32,
            docsIfCmServiceTxSlotsDed        Counter32,
            docsIfCmServiceTxRetries         Counter32,

--          docsIfCmServiceTxExceeded        Counter32,
            docsIfCmServiceTxExceededs       Counter32,
            docsIfCmServiceRqRetries         Counter32,
--          docsIfCmServiceRqExceeded        Counter32
            docsIfCmServiceRqExceededs       Counter32
         }

docsIfCmServiceId OBJECT-TYPE
        SYNTAX      Integer32 (1..16383)
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
           "Identifies a service queue for upstream bandwidth. The
            attributes of this service queue are shared between the
            CM and the CMTS. The CMTS allocates upstream bandwidth
            to this service queue based on requests from the CM and
            on the class of service associated with this queue."
        ::= { docsIfCmServiceEntry 1 }

docsIfCmServiceQosProfile OBJECT-TYPE
        SYNTAX      Integer32 (0..16383)
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
           "The index in docsIfQosProfileTable describing the quality
            of service attributes associated with this particular
            service. If no associated entry in docsIfQosProfileTable
            exists, this object returns a value of zero."
        ::= { docsIfCmServiceEntry 2 }

docsIfCmServiceTxSlotsImmed OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
           "The number of upstream mini-slots which have been used to
            transmit data PDUs in immediate (contention) mode. This
            includes only those PDUs which are presumed to have
            arrived at the headend (i.e., those which were explicitly
            acknowledged.) It does not include retransmission attempts
            or mini-slots used by Requests."
        REFERENCE
           "DOCSIS Radio Frequency Interface specification,
```

```
                        Section 6.4."
                ::= { docsIfCmServiceEntry 3 }


docsIfCmServiceTxSlotsDed OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The number of upstream mini-slots which have been used to
             transmit data PDUs in dedicated mode (i.e., as a result
             of a unicast Data Grant)."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 6.4."
        ::= { docsIfCmServiceEntry 4 }


docsIfCmServiceTxRetries OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The number of attempts to transmit data PDUs containing
             requests for acknowledgment which did not result in
             acknowledgment."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 6.4."
        ::= { docsIfCmServiceEntry 5 }


-- docsIfCmServiceTxExceeded renamed for Counter32 naming requirements
docsIfCmServiceTxExceededs OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The number of data PDUs transmission failures due to
             excessive retries without acknowledgment."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 6.4."
        ::= { docsIfCmServiceEntry 6 }


docsIfCmServiceRqRetries OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The number of attempts to transmit bandwidth requests
```

```
                which did not result in acknowledgment."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 6.4."
        ::= { docsIfCmServiceEntry 7 }


-- docsIfCmServiceRqExceeded renamed for Counter 32 naming
-- requirements
docsIfCmServiceRqExceededs OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The number of requests for bandwidth which failed due to
             excessive retries without acknowledgment."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 6.4."
        ::= { docsIfCmServiceEntry 8 }

--
-- CMTS GROUP
--


--
-- The CMTS MAC Table
--

docsIfCmtsMacTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF DocsIfCmtsMacEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Describes the attributes of each CMTS MAC interface,
             extending the information available from ifEntry.
             Mandatory for all CMTS devices."
        ::= { docsIfCmtsObjects 1 }

docsIfCmtsMacEntry OBJECT-TYPE
        SYNTAX      DocsIfCmtsMacEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "An entry containing objects describing attributes of each
             MAC entry, extending the information in ifEntry.
             An entry in this table exists for each ifEntry with an
             ifType of docsCableMaclayer(127)."
```

```
        INDEX { ifIndex }
        ::= { docsIfCmtsMacTable 1 }


DocsIfCmtsMacEntry ::= SEQUENCE {
        docsIfCmtsCapabilities          BITS,
        docsIfCmtsSyncInterval          Integer32,
        docsIfCmtsUcdInterval           Integer32,
        docsIfCmtsMaxServiceIds         Integer32,
        docsIfCmtsInsertionInterval     TimeTicks,   -- Obsolete
        docsIfCmtsInvitedRangingAttempts Integer32,
        docsIfCmtsInsertInterval        TimeInterval
        }


docsIfCmtsCapabilities OBJECT-TYPE
        SYNTAX      BITS {
            atmCells(0),
            concatenation(1)
        }
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Identifies the capabilities of the CMTS MAC
             implementation at this interface. Note that packet
             transmission is always supported. Therefore, there
             is no specific bit required to explicitly indicate
             this capability."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Chapter 6."
        ::= { docsIfCmtsMacEntry 1 }


docsIfCmtsSyncInterval OBJECT-TYPE
        SYNTAX      Integer32 (1..200)
        UNITS       "Milliseconds"
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "The interval between CMTS transmission of successive SYNC
             messages at this interface."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Section 6.5 and Appendix B."
        ::= { docsIfCmtsMacEntry 2 }


docsIfCmtsUcdInterval OBJECT-TYPE
        SYNTAX      Integer32 (1..2000)
        UNITS       "Milliseconds"
        MAX-ACCESS  read-write
```

```
        STATUS      current
        DESCRIPTION
            "The interval between CMTS transmission of successive
             Upstream Channel Descriptor messages for each upstream
             channel at this interface."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Section 6.5 and Appendix B."
        ::= { docsIfCmtsMacEntry 3 }

docsIfCmtsMaxServiceIds OBJECT-TYPE
        SYNTAX      Integer32 (1..16383)
        MAX-ACCESS read-only
        STATUS      current
        DESCRIPTION
            "The maximum number of service IDs that may be
             simultaneously active."
        ::= { docsIfCmtsMacEntry 4 }


-- This object has been obsoleted and replaced by
-- docsIfCmtsInsertInterval to fix a SYNTAX typing problem.  New
-- implementations of this MIB should use that object instead.
docsIfCmtsInsertionInterval OBJECT-TYPE
        SYNTAX      TimeTicks
        MAX-ACCESS  read-write
        STATUS      obsolete
        DESCRIPTION
            "The amount of time to elapse between each broadcast
             station maintenance grant. Broadcast station maintenance
             grants are used to allow new cable modems to join the
             network. Zero indicates that a vendor-specific algorithm
             is used instead of a fixed time. Maximum amount of time
             permitted by the specification is 2 seconds."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Appendix B, Ranging Interval."
        ::= { docsIfCmtsMacEntry 5 }

docsIfCmtsInvitedRangingAttempts OBJECT-TYPE
        SYNTAX      Integer32 (0..1024)
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "The maximum number of attempts to make on invitations
             for ranging requests. A value of zero means the system
             should attempt to range forever."
        REFERENCE
```

```
                  "DOCSIS Radio Frequency Interface specification,
                   Section 7.2.5 and Appendix B."
             ::= { docsIfCmtsMacEntry 6 }

docsIfCmtsInsertInterval OBJECT-TYPE
         SYNTAX      TimeInterval
         MAX-ACCESS  read-write
         STATUS      current
         DESCRIPTION
             "The amount of time to elapse between each broadcast
              station maintenance grant. Broadcast station maintenance
              grants are used to allow new cable modems to join the
              network. Zero indicates that a vendor-specific algorithm
              is used instead of a fixed time. Maximum amount of time
              permitted by the specification is 2 seconds."
         REFERENCE
             "DOCSIS Radio Frequency Interface Specification,
              Appendix B."
         ::= { docsIfCmtsMacEntry 7 }

--
--
-- CMTS status table.
--

docsIfCmtsStatusTable OBJECT-TYPE
         SYNTAX      SEQUENCE OF DocsIfCmtsStatusEntry
         MAX-ACCESS  not-accessible
         STATUS      current
         DESCRIPTION
             "For the MAC layer, this group maintains a number of
              status objects and counters."
         ::= { docsIfCmtsObjects 2 }

docsIfCmtsStatusEntry OBJECT-TYPE
         SYNTAX      DocsIfCmtsStatusEntry
         MAX-ACCESS  not-accessible
         STATUS      current
         DESCRIPTION
             "Status entry for a single MAC layer.
              An entry in this table exists for each ifEntry with an
              ifType of docsCableMaclayer(127)."
         INDEX { ifIndex }
         ::= { docsIfCmtsStatusTable 1 }

DocsIfCmtsStatusEntry ::= SEQUENCE {
             docsIfCmtsStatusInvalidRangeReqs        Counter32,
             docsIfCmtsStatusRangingAborteds         Counter32,
```

```
             docsIfCmtsStatusInvalidRegReqs            Counter32,
             docsIfCmtsStatusFailedRegReqs             Counter32,
             docsIfCmtsStatusInvalidDataReqs           Counter32,
             docsIfCmtsStatusT5Timeouts                Counter32
         }

docsIfCmtsStatusInvalidRangeReqs OBJECT-TYPE
         SYNTAX      Counter32
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
            "This object counts invalid RNG-REQ messages received on
             this interface."
         ::= { docsIfCmtsStatusEntry 1 }

docsIfCmtsStatusRangingAborteds OBJECT-TYPE
         SYNTAX      Counter32
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
            "This object counts ranging attempts that were explicitly
             aborted by the CMTS."
         ::= { docsIfCmtsStatusEntry 2 }

docsIfCmtsStatusInvalidRegReqs OBJECT-TYPE
         SYNTAX      Counter32
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
            "This object counts invalid REG-REQ messages received on
             this interface."
         ::= { docsIfCmtsStatusEntry 3 }

docsIfCmtsStatusFailedRegReqs OBJECT-TYPE
         SYNTAX      Counter32
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
            "This object counts failed registration attempts, i.e.,
             authentication failures and class of service failures,
             on this interface."
         ::= { docsIfCmtsStatusEntry 4 }

docsIfCmtsStatusInvalidDataReqs OBJECT-TYPE
         SYNTAX      Counter32
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
```

```
                "This object counts invalid data request messages
                 received on this interface."
            ::= { docsIfCmtsStatusEntry 5 }


docsIfCmtsStatusT5Timeouts OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "This object counts the number of times counter T5
             expired on this interface."
            ::= { docsIfCmtsStatusEntry 6 }


--
-- CM status table (within CMTS).
-- This table is implemented only at the CMTS.
-- It contains per CM status information available in the CMTS.
--

docsIfCmtsCmStatusTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF DocsIfCmtsCmStatusEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "A set of objects in the CMTS, maintained for each
             Cable Modem connected to this CMTS."
            ::= { docsIfCmtsObjects 3 }


docsIfCmtsCmStatusEntry OBJECT-TYPE
        SYNTAX      DocsIfCmtsCmStatusEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Status information for a single Cable Modem.
             An entry in this table exists for each Cable Modem
             that is connected to the CMTS implementing this table."
        INDEX { docsIfCmtsCmStatusIndex }
        ::= { docsIfCmtsCmStatusTable 1 }

DocsIfCmtsCmStatusEntry ::= SEQUENCE {
        docsIfCmtsCmStatusIndex               Integer32,
        docsIfCmtsCmStatusMacAddress          MacAddress,
        docsIfCmtsCmStatusIpAddress           IpAddress,
        docsIfCmtsCmStatusDownChannelIfIndex  InterfaceIndexOrZero,
        docsIfCmtsCmStatusUpChannelIfIndex    InterfaceIndexOrZero,
        docsIfCmtsCmStatusRxPower             TenthdBmV,
        docsIfCmtsCmStatusTimingOffset        Unsigned32,
        docsIfCmtsCmStatusEqualizationData    OCTET STRING,
```

```
            docsIfCmtsCmStatusValue              INTEGER,
            docsIfCmtsCmStatusUnerroreds         Counter32,
            docsIfCmtsCmStatusCorrecteds         Counter32,
            docsIfCmtsCmStatusUncorrectables     Counter32,
            docsIfCmtsCmStatusSignalNoise        TenthdB,
            docsIfCmtsCmStatusMicroreflections   Integer32
         }

docsIfCmtsCmStatusIndex OBJECT-TYPE
        SYNTAX      Integer32 (1..2147483647)
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
           "Index value to uniquely identify an entry in this table.
            For an individual Cable Modem, this index value should
            not change during CMTS uptime."
        ::= { docsIfCmtsCmStatusEntry 1 }

docsIfCmtsCmStatusMacAddress OBJECT-TYPE
        SYNTAX      MacAddress
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
           "MAC address of this Cable Modem. If the Cable Modem has
            multiple MAC addresses, this is the MAC address associated
            with the Cable interface."
        ::= { docsIfCmtsCmStatusEntry 2 }

docsIfCmtsCmStatusIpAddress OBJECT-TYPE
        SYNTAX      IpAddress
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
           "IP address of this Cable Modem. If the Cable Modem has no
            IP address assigned, or the IP address is unknown, this
            object returns a value of 0.0.0.0. If the Cable Modem has
            multiple IP addresses, this object returns the IP address
            associated with the Cable interface."
        ::= { docsIfCmtsCmStatusEntry 3 }

docsIfCmtsCmStatusDownChannelIfIndex OBJECT-TYPE
        SYNTAX      InterfaceIndexOrZero
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
           "IfIndex of the downstream channel this CM is connected
            to. If the downstream channel is unknown, this object
            returns a value of zero."
```

```
        ::= { docsIfCmtsCmStatusEntry 4 }


docsIfCmtsCmStatusUpChannelIfIndex OBJECT-TYPE
        SYNTAX         InterfaceIndexOrZero
        MAX-ACCESS  read-only
        STATUS         current
        DESCRIPTION
            "IfIndex of the upstream channel this CM is connected
             to. If the upstream channel is unknown, this object
             returns a value of zero."
        ::= { docsIfCmtsCmStatusEntry 5 }


docsIfCmtsCmStatusRxPower OBJECT-TYPE
        SYNTAX         TenthdBmV
        UNITS          "dBmV"
        MAX-ACCESS  read-only
        STATUS         current
        DESCRIPTION
            "The receive power as percieved for upstream data from
             this Cable Modem.
             If the receive power is unknown, this object returns
             a value of zero."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Table 4-13."
        ::= { docsIfCmtsCmStatusEntry 6 }


docsIfCmtsCmStatusTimingOffset OBJECT-TYPE
        SYNTAX         Unsigned32
        MAX-ACCESS  read-only
        STATUS         current
        DESCRIPTION
            "A measure of the current round trip time for this CM.
             Used for timing of CM upstream transmissions to ensure
             synchronized arrivals at the CMTS. Units are in terms
             of (6.25 microseconds/64). Returns zero if the value
             is unknown."
        REFERENCE
            "DOCSIS Radio Frequency Interface Specification,
             Section 6.5."
        ::= { docsIfCmtsCmStatusEntry 7 }


docsIfCmtsCmStatusEqualizationData OBJECT-TYPE
        SYNTAX         OCTET STRING
        MAX-ACCESS  read-only
        STATUS         current
        DESCRIPTION
            "Equalization data for this CM. Returns an empty string
```

```
             if the value is unknown or if there is no equalization
             data available or defined."
         REFERENCE
             "DOCSIS Radio Frequency Interface Specification,
              Figure 6-23."
         ::= { docsIfCmtsCmStatusEntry 8 }

docsIfCmtsCmStatusValue OBJECT-TYPE
         SYNTAX      INTEGER {
             other(1),
             ranging(2),
             rangingAborted(3),
             rangingComplete(4),
             ipComplete(5),
             registrationComplete(6),
             accessDenied(7)
         }
         MAX-ACCESS  read-only
         STATUS      current
         DESCRIPTION
             "Current Cable Modem connectivity state, as specified
              in the RF Interface Specification. Returned status
              information is the CM status as assumed by the CMTS,
              and indicates the following events:
              other(1)
                 Any state other than below.
              ranging(2)
                 The CMTS has received an Initial Ranging Request
                 message from the CM, and the ranging process is not
                 yet complete.
              rangingAborted(3)
                 The CMTS has sent a Ranging Abort message to the CM.
              rangingComplete(4)
                 The CMTS has sent a Ranging Complete message to the CM.
              ipComplete(5)
                 The CMTS has received a DHCP reply message and forwarded
                 it to the CM.
              registrationComplete(6)
                 The CMTS has sent a Registration Response mesage to
                 the CM.
              accessDenied(7)
                 The CMTS has sent a Registration Aborted message
                 to the CM.
              The CMTS only needs to report states it is able to detect."
         REFERENCE
             "DOCSIS Radio Frequency Interface Specification,
              Chapter 7.2."
         ::= { docsIfCmtsCmStatusEntry 9 }
```

docsIfCmtsCmStatusUnerroreds OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "Codewords received without error from this Cable Modem."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 4.2.3"
        ::= { docsIfCmtsCmStatusEntry 10 }

docsIfCmtsCmStatusCorrecteds OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "Codewords received with correctable errors from this
             Cable Modem."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 4.2.3"
        ::= { docsIfCmtsCmStatusEntry 11 }

docsIfCmtsCmStatusUncorrectables OBJECT-TYPE
        SYNTAX   Counter32
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "Codewords received with uncorrectable errors from this
             Cable Modem."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 4.2.3"
        ::= { docsIfCmtsCmStatusEntry 12 }

docsIfCmtsCmStatusSignalNoise OBJECT-TYPE
        SYNTAX   TenthdB
        UNITS   "dB"
        MAX-ACCESS read-only
        STATUS   current
        DESCRIPTION
            "Signal/Noise ratio as perceived for upstream data from
             this Cable Modem.
             If the Signal/Noise is unknown, this object returns
             a value of zero."
        ::= { docsIfCmtsCmStatusEntry 13 }

docsIfCmtsCmStatusMicroreflections OBJECT-TYPE

```
        SYNTAX      Integer32 (0..255)
        UNITS       "dBc"
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "Total microreflections including in-channel response
             as perceived on this interface, measured in dBc below
             the signal level.
             This object is not assumed to return an absolutely
             accurate value, but should give a rough indication
             of microreflections received on this interface.
             It is up to the implementor to provide information
             as accurate as possible."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Table 2-1 and 2-2"
        ::= { docsIfCmtsCmStatusEntry 14 }

--
-- The CMTS Service Table.
--

docsIfCmtsServiceTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF DocsIfCmtsServiceEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Describes the attributes of upstream service queues
             in a Cable Modem Termination System."
        ::= { docsIfCmtsObjects 4 }

docsIfCmtsServiceEntry OBJECT-TYPE
        SYNTAX      DocsIfCmtsServiceEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
            "Describes the attributes of a single upstream bandwidth
             service queue.
             Entries in this table exist for each ifEntry with an
             ifType of docsCableMaclayer(127), and for each service
             queue (Service ID) within this MAC layer.
             Entries in this table are created with the creation of
             individual Service IDs by the MAC layer and removed
             when a Service ID is removed."
        INDEX { ifIndex, docsIfCmtsServiceId }
        ::= { docsIfCmtsServiceTable 1 }

DocsIfCmtsServiceEntry ::= SEQUENCE {
```

```
        docsIfCmtsServiceId                Integer32,
        docsIfCmtsServiceCmStatusIndex     Integer32,
        docsIfCmtsServiceAdminStatus       INTEGER,
        docsIfCmtsServiceQosProfile        Integer32,
        docsIfCmtsServiceCreateTime        TimeStamp,
        docsIfCmtsServiceInOctets          Counter32,
        docsIfCmtsServiceInPackets         Counter32
      }

docsIfCmtsServiceId OBJECT-TYPE
      SYNTAX       Integer32 (1..16383)
      MAX-ACCESS   not-accessible
      STATUS       current
      DESCRIPTION
          "Identifies a service queue for upstream bandwidth. The
           attributes of this service queue are shared between the
           Cable Modem and the Cable Modem Termination System.
           The CMTS allocates upstream bandwidth to this service
           queue based on requests from the CM and on the class of
           service associated with this queue."
      ::= { docsIfCmtsServiceEntry 1 }

docsIfCmtsServiceCmStatusIndex OBJECT-TYPE
      SYNTAX       Integer32 (0..65535)
      MAX-ACCESS   read-only
      STATUS       current
      DESCRIPTION
          "Pointer to an entry in docsIfCmtsCmStatusTable identifying
           the Cable Modem using this Service Queue. If multiple
           Cable Modems are using this Service Queue, the value of
           this object is zero."
      ::= { docsIfCmtsServiceEntry 2 }

docsIfCmtsServiceAdminStatus OBJECT-TYPE
      SYNTAX       INTEGER {
          enabled(1),
          disabled(2),
          destroyed(3) }
      MAX-ACCESS   read-write
      STATUS       current
      DESCRIPTION
          "Allows a service class for a particular modem to be
           suppressed, (re-)enabled, or deleted altogether."
      ::= { docsIfCmtsServiceEntry 3 }

docsIfCmtsServiceQosProfile OBJECT-TYPE
      SYNTAX       Integer32 (0..16383)
      MAX-ACCESS   read-only
```

```
             STATUS       current
             DESCRIPTION
                 "The index in docsIfQosProfileTable describing the quality
                  of service attributes associated with this particular
                  service. If no associated docsIfQosProfileTable entry
                  exists, this object returns a value of zero."
             ::= { docsIfCmtsServiceEntry 4 }


docsIfCmtsServiceCreateTime OBJECT-TYPE

--       SYNTAX       TimeTicks
         SYNTAX       TimeStamp
         MAX-ACCESS   read-only
         STATUS       current
         DESCRIPTION
             "The value of sysUpTime when this entry was created."
             ::= { docsIfCmtsServiceEntry 5 }


docsIfCmtsServiceInOctets OBJECT-TYPE
         SYNTAX       Counter32
         MAX-ACCESS   read-only
         STATUS       current
         DESCRIPTION
             "The cumulative number of Packet Data octets received
              on this Service ID. The count does not include the
              size of the Cable MAC header"
             ::= { docsIfCmtsServiceEntry 6 }


docsIfCmtsServiceInPackets OBJECT-TYPE
         SYNTAX       Counter32
         MAX-ACCESS   read-only
         STATUS       current
         DESCRIPTION
             "The cumulative number of Packet Data packets received
              on this Service ID."
             ::= { docsIfCmtsServiceEntry 7 }

--
-- The following table provides upstream channel modulation profiles.
-- Entries in this table can be
-- re-used by one or more upstream channels. An upstream channel will
-- have a modulation profile
-- for each value of docsIfModIntervalUsageCode.
--

docsIfCmtsModulationTable OBJECT-TYPE
         SYNTAX       SEQUENCE OF DocsIfCmtsModulationEntry
         MAX-ACCESS   not-accessible
```

          STATUS   current
          DESCRIPTION
             "Describes a modulation profile associated with one or more
              upstream channels."
          ::= { docsIfCmtsObjects 5 }

docsIfCmtsModulationEntry OBJECT-TYPE
          SYNTAX   DocsIfCmtsModulationEntry
          MAX-ACCESS   not-accessible
          STATUS   current
          DESCRIPTION
             "Describes a modulation profile for an Interval Usage Code
              for one or more upstream channels.
              Entries in this table are created by the operator. Initial
              default entries may be created at system initialization
              time. No individual objects have to be specified in order
              to create an entry in this table.
              Note that some objects do not have DEFVALs, but do have
              calculated defaults and need not be specified during row
              creation.
              There is no restriction on the changing of values in this
              table while their associated rows are active."
          INDEX { docsIfCmtsModIndex, docsIfCmtsModIntervalUsageCode }
          ::= { docsIfCmtsModulationTable 1 }

DocsIfCmtsModulationEntry ::= SEQUENCE {
          docsIfCmtsModIndex   Integer32,
          docsIfCmtsModIntervalUsageCode   INTEGER,
          docsIfCmtsModControl   RowStatus,
          docsIfCmtsModType   INTEGER,
          docsIfCmtsModPreambleLen   Integer32,
          docsIfCmtsModDifferentialEncoding   TruthValue,
          docsIfCmtsModFECErrorCorrection   Integer32,
          docsIfCmtsModFECCodewordLength   Integer32,
          docsIfCmtsModScramblerSeed   Integer32,
          docsIfCmtsModMaxBurstSize   Integer32,
          docsIfCmtsModGuardTimeSize   Unsigned32,
          docsIfCmtsModLastCodewordShortened TruthValue,
          docsIfCmtsModScrambler   TruthValue
          }

docsIfCmtsModIndex OBJECT-TYPE
          SYNTAX   Integer32 (1..2147483647)
          MAX-ACCESS   not-accessible
          STATUS   current
          DESCRIPTION
             "An index into the Channel Modulation table representing
              a group of Interval Usage Codes, all associated with the

                      same channel."
                ::= { docsIfCmtsModulationEntry 1 }

docsIfCmtsModIntervalUsageCode OBJECT-TYPE
        SYNTAX   INTEGER {
            request(1),
            requestData(2),
            initialRanging(3),
            periodicRanging(4),
            shortData(5),
            longData(6)
        }
        MAX-ACCESS not-accessible
        STATUS   current
        DESCRIPTION
            "An index into the Channel Modulation table which, when
             grouped with other Interval Usage Codes, fully
             instantiate all modulation sets for a given upstream
             channel."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Table 6-16."
        ::= { docsIfCmtsModulationEntry 2 }

docsIfCmtsModControl OBJECT-TYPE
        SYNTAX   RowStatus
        MAX-ACCESS read-create
        STATUS   current
        DESCRIPTION
            "Controls and reflects the status of rows in this table."
        ::= { docsIfCmtsModulationEntry 3 }

docsIfCmtsModType OBJECT-TYPE
        SYNTAX   INTEGER {
            other(1),
            qpsk(2),
            qam16(3)
        }
        MAX-ACCESS read-create
        STATUS   current
        DESCRIPTION
            "The modulation type used on this channel. Returns
             other(1) if the modulation type is neither qpsk or
             qam16. See the reference for the modulation profiles
             implied by qpsk or qam16. See the conformance object for
             write conditions and limitations."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,

```
              Section 4.2.2."
        DEFVAL { qpsk }
        ::= { docsIfCmtsModulationEntry 4 }


docsIfCmtsModPreambleLen OBJECT-TYPE
        SYNTAX       Integer32 (0..1024)
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "The preamble length for this modulation profile in bits.
             Default value is the minimum needed by the implementation
             at the CMTS for the given modulation profile."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 4.2.5."
        ::= { docsIfCmtsModulationEntry 5 }


docsIfCmtsModDifferentialEncoding OBJECT-TYPE
        SYNTAX       TruthValue
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "Specifies whether or not differential encoding is used
             on this channel."
        DEFVAL { false }
        ::= { docsIfCmtsModulationEntry 6 }


docsIfCmtsModFECErrorCorrection OBJECT-TYPE
        SYNTAX       Integer32 (0..10)
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "The number of correctable errored bytes (t) used in
             forward error correction code. The value of 0 indicates
             no correction is employed. The number of check bytes
             appended will be twice this value."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 4.2.3."
        DEFVAL { 0 }
        ::= { docsIfCmtsModulationEntry 7 }


docsIfCmtsModFECCodewordLength OBJECT-TYPE
        SYNTAX       Integer32 (1..255)
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "The number of data bytes (k) in the forward error
```

               correction codeword.
               This object is not used if docsIfCmtsModFECErrorCorrection
               is zero."
          REFERENCE
               "DOCSIS Radio Frequency Interface specification,
               Section 4.2.3."
          DEFVAL { 32 }
          ::= { docsIfCmtsModulationEntry 8 }

docsIfCmtsModScramblerSeed OBJECT-TYPE
          SYNTAX   Integer32 (0..32767)
          MAX-ACCESS read-create
          STATUS   current
          DESCRIPTION
               "The 15 bit seed value for the scrambler polynomial."
          REFERENCE
               "DOCSIS Radio Frequency Interface specification,
               Section 4.2.4."
          DEFVAL { 0 }
          ::= { docsIfCmtsModulationEntry 9 }

docsIfCmtsModMaxBurstSize OBJECT-TYPE
          SYNTAX   Integer32 (0..255)
          MAX-ACCESS read-create
          STATUS   current
          DESCRIPTION
               "The maximum number of mini-slots that can be transmitted
                during this channel's burst time. Returns zero if the
                burst length is bounded by the allocation MAP rather than
                this profile.
                Default value is 0 except for shortData, where it is 8."
          ::= { docsIfCmtsModulationEntry 10 }

docsIfCmtsModGuardTimeSize OBJECT-TYPE
          SYNTAX   Unsigned32
          MAX-ACCESS read-only
          STATUS   current
          DESCRIPTION
               "The number of symbol-times which must follow the end of
                this channel's burst. Default value is the minimum time
                needed by the implementation for this modulation profile."
          REFERENCE
               "DOCSIS Radio Frequency Interface specification,
               Section 4.2.7."
          ::= { docsIfCmtsModulationEntry 11 }

docsIfCmtsModLastCodewordShortened OBJECT-TYPE
          SYNTAX   TruthValue

```
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
            "Indicates if the last FEC codeword is truncated."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 4.2.10."
        DEFVAL { true }
        ::= { docsIfCmtsModulationEntry 12 }

docsIfCmtsModScrambler OBJECT-TYPE
        SYNTAX      TruthValue
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
            "Indicates if the scrambler is employed."
        REFERENCE
            "DOCSIS Radio Frequency Interface specification,
             Section 4.2.4."
        DEFVAL { false }
        ::= { docsIfCmtsModulationEntry 13 }

docsIfCmtsQosProfilePermissions OBJECT-TYPE
        SYNTAX      BITS {
            createByManagement(0),
            updateByManagement(1),
            createByModems(2)
        }
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
            "This object specifies permitted methods of creating
             entries in docsIfQosProfileTable.
             CreateByManagement(0) is set if entries can be created
             using SNMP. UpdateByManagement(1) is set if updating
             entries using SNMP is permitted. CreateByModems(2)
             is set if entries can be created based on information
             in REG-REQ MAC messages received from Cable Modems.
             Information in this object is only applicable if
             docsIfQosProfileTable is implemented as read-create.
             Otherwise, this object is implemented as read-only
             and returns CreateByModems(2).
             Either CreateByManagement(0) or CreateByModems(1)
             must be set when writing to this object."
        ::= { docsIfCmtsObjects 6 }

docsIfCmtsMacToCmTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF DocsIfCmtsMacToCmEntry
```

```
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
           "This is a table to provide a quick access index into the
            docsIfCmtsCmStatusTable. There is exactly one row in this
            table for each row in the docsIfCmtsCmStatusTable. In
            general, the management station should use this table only
            to get a pointer into the docsIfCmtsCmStatusTable (which
            corresponds to the CM's RF interface MAC address), and
            should not iterate (e.g. GetNext through) this table."
     ::= { docsIfCmtsObjects 7 }

docsIfCmtsMacToCmEntry OBJECT-TYPE
        SYNTAX      DocsIfCmtsMacToCmEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
           "A row in the docsIfCmtsMacToCmTable.
            An entry in this table exists for each Cable Modem
            that is connected to the CMTS implementing this table."
        INDEX   { docsIfCmtsCmMac }
        ::= {docsIfCmtsMacToCmTable 1 }

DocsIfCmtsMacToCmEntry ::= SEQUENCE {
            docsIfCmtsCmMac     MacAddress,
            docsIfCmtsCmPtr     Integer32
        }

docsIfCmtsCmMac OBJECT-TYPE
        SYNTAX      MacAddress
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
           "The RF side MAC address for the referenced CM. (E.g. the
            interface on the CM that has docsCableMacLayer(127) as
            its ifType."
     ::= { docsIfCmtsMacToCmEntry 1 }

docsIfCmtsCmPtr OBJECT-TYPE
        SYNTAX      Integer32 (1..2147483647)
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
           "An row index into docsIfCmtsCmStatusTable. When queried
            with the correct instance value (e.g. a CM's MAC address),
            returns the index in docsIfCmtsCmStatusTable which
            represents that CM."
     ::= { docsIfCmtsMacToCmEntry 2 }
```

```
--
-- notification group is for future extension.
--
docsIfNotification OBJECT IDENTIFIER      ::= { docsIfMib 2 }

docsIfConformance  OBJECT IDENTIFIER      ::= { docsIfMib 3 }
docsIfCompliances  OBJECT IDENTIFIER      ::= { docsIfConformance 1 }
docsIfGroups       OBJECT IDENTIFIER      ::= { docsIfConformance 2 }

-- compliance statements

docsIfBasicCompliance MODULE-COMPLIANCE
        STATUS      current
        DESCRIPTION
            "The compliance statement for devices that implement
             MCNS/DOCSIS compliant Radio Frequency Interfaces."

MODULE  -- docsIfMib

-- unconditionally mandatory groups
MANDATORY-GROUPS {
        docsIfBasicGroup
        }

-- conditionally mandatory group
GROUP docsIfCmGroup
        DESCRIPTION
            "This group is implemented only in Cable Modems, not in
             Cable Modem Termination Systems."

-- conditionally mandatory group
GROUP docsIfCmtsGroup
        DESCRIPTION
            "This group is implemented only in Cable Modem Termination
             Systems, not in Cable Modems."

OBJECT  docsIfDownChannelFrequency
    WRITE-SYNTAX Integer32 (54000000..860000000)
        MIN-ACCESS  read-only
        DESCRIPTION
            "Read-write in Cable Modem Termination Systems;
             read-only in Cable Modems.  The values above are
             appropriate for a cable plant using a  Sub-Split channel
             plan.  If DOCSIS is extended to cover other types of
             channel plans (and frequency allocations) this object
             will be modified accordingly."

OBJECT  docsIfDownChannelWidth
```

         WRITE-SYNTAX Integer32 (6000000)
         MIN-ACCESS   read-only
         DESCRIPTION
             "It is conformant to implement this object as read-only.
              In Cable Modems, this object is always implemented as
              read-only. The above value is appropriate for cable
              plants running under NTSC (National Television
              Standards Committee) standards. If DOCSIS is extended to
              work with other standard (e.g. European standards), this
              object will be modified accordingly."

OBJECT   docsIfDownChannelModulation
         WRITE-SYNTAX INTEGER {
                              qam64 (3),
                              qam256 (4)
                             }
         MIN-ACCESS   read-only
         DESCRIPTION
             "Read-write in Cable Modem Termination Systems;
              read-only in Cable Modems."

OBJECT   docsIfDownChannelInterleave
         WRITE-SYNTAX INTEGER {
                     taps8Increment16(3),
                     taps16Increment8(4),
                     taps32Increment4(5),
                     taps64Increment2(6),
                     taps128Increment1(7)
                      }
         MIN-ACCESS   read-only
         DESCRIPTION
             "Read-write in Cable Modem Termination Systems;
              read-only in Cable Modems."

OBJECT   docsIfDownChannelPower
         MIN-ACCESS   read-only
         DESCRIPTION
             "Read-write in Cable Modem Termination Systems;
              read-only in Cable Modems."

OBJECT   docsIfUpChannelFrequency
    WRITE-SYNTAX Integer32 (5000000..42000000)
         MIN-ACCESS   read-only
         DESCRIPTION
             "Read-write in Cable Modem Termination Systems;
              read-only in Cable Modems.The values above are
              appropriate for a cable plant using a Sub-Split channel
              plan. If DOCSIS is extended to cover other types of

          channel plans (and frequency allocations) this object
          will be modified accordingly."

OBJECT   docsIfUpChannelWidth
         WRITE-SYNTAX Integer32 (200000..3200000)
         MIN-ACCESS   read-only
         DESCRIPTION
            "Read-write in Cable Modem Termination Systems;
             read-only in Cable Modems.The above value is appropriate
             for cable plants running under NTSC (National Television
             Standards Committee) standards. If DOCSIS is extended to
             work with other standard (e.g. European standards), this
             object will be modified accordingly."

OBJECT   docsIfUpChannelModulationProfile
         MIN-ACCESS   read-only
         DESCRIPTION
            "Read-write in Cable Modem Termination Systems;
             read-only in Cable Modems."

OBJECT   docsIfUpChannelSlotSize
         MIN-ACCESS   read-only
         DESCRIPTION
            "This object is always read-only in Cable Modems.
             It is compliant to implement this object as read-only
             in Cable Modem Termination Systems."

OBJECT   docsIfUpChannelRangingBackoffStart
         MIN-ACCESS   read-only
         DESCRIPTION
            "Read-write in Cable Modem Termination Systems;
             read-only in Cable Modems."

OBJECT   docsIfUpChannelRangingBackoffEnd
         MIN-ACCESS   read-only
         DESCRIPTION
            "Read-write in Cable Modem Termination Systems;
             read-only in Cable Modems."

OBJECT   docsIfUpChannelTxBackoffStart
         MIN-ACCESS   read-only
         DESCRIPTION
            "Read-write in Cable Modem Termination Systems;
             read-only in Cable Modems."

OBJECT   docsIfUpChannelTxBackoffEnd
         MIN-ACCESS   read-only
         DESCRIPTION

                    "Read-write in Cable Modem Termination Systems;
                     read-only in Cable Modems."

OBJECT   docsIfQosProfPriority
         MIN-ACCESS   read-only
         DESCRIPTION
             "This object is always read-only in Cable Modems.
              It is compliant to implement this object as read-only
              in Cable Modem Termination Systems."

OBJECT   docsIfQosProfMaxUpBandwidth
         MIN-ACCESS   read-only
         DESCRIPTION
             "This object is always read-only in Cable Modems.
              It is compliant to implement this object as read-only
              in Cable Modem Termination Systems."

OBJECT   docsIfQosProfGuarUpBandwidth
         MIN-ACCESS   read-only
         DESCRIPTION
             "This object is always read-only in Cable Modems.
              It is compliant to implement this object as read-only
              in Cable Modem Termination Systems."

OBJECT   docsIfQosProfMaxDownBandwidth
         MIN-ACCESS   read-only
         DESCRIPTION
             "This object is always read-only in Cable Modems.
              It is compliant to implement this object as read-only
              in Cable Modem Termination Systems."

OBJECT   docsIfQosProfMaxTxBurst
         MIN-ACCESS   read-only
         DESCRIPTION
             "This object is always read-only in Cable Modems.
              It is compliant to implement this object as read-only
              in Cable Modem Termination Systems."

OBJECT   docsIfQosProfBaselinePrivacy
         MIN-ACCESS   read-only
         DESCRIPTION
             "This object is always read-only in Cable Modems.
              It is compliant to implement this object as read-only
              in Cable Modem Termination Systems."

OBJECT   docsIfQosProfStatus
         MIN-ACCESS   read-only
         DESCRIPTION

                "This object is always read-only in Cable Modems.
                 It is compliant to implement this object as read-only
                 in Cable Modem Termination Systems."

        OBJECT   docsIfCmtsServiceAdminStatus
                MIN-ACCESS read-only
                DESCRIPTION
                   "It is compliant to implement this object as read-only."

        OBJECT   docsIfCmtsSyncInterval
                MIN-ACCESS read-only
                DESCRIPTION
                   "It is compliant to implement this object as read-only."

        OBJECT   docsIfCmtsUcdInterval
                MIN-ACCESS read-only
                DESCRIPTION
                   "It is compliant to implement this object as read-only."

        OBJECT   docsIfCmtsInsertInterval
                MIN-ACCESS read-only
                DESCRIPTION
                   "It is compliant to implement this object as read-only."

        OBJECT   docsIfCmtsInvitedRangingAttempts
                MIN-ACCESS read-only
                DESCRIPTION
                   "It is compliant to implement this object as read-only."

        OBJECT   docsIfCmtsQosProfilePermissions
                MIN-ACCESS read-only
                DESCRIPTION
                   "It is compliant to implement this object as read-only."

        OBJECT docsIfCmtsModType
                WRITE-SYNTAX INTEGER {
                             qpsk (2),
                             qam16 (3)
                              }
                DESCRIPTION
                    "Management station may only set 16QAM or QPSK modulation,
                     but others might be possible based on device configuration."

                ::= { docsIfCompliances 1 }

docsIfBasicGroup OBJECT-GROUP
        OBJECTS {

```
            docsIfDownChannelId,
            docsIfDownChannelFrequency,
            docsIfDownChannelWidth,
            docsIfDownChannelModulation,
            docsIfDownChannelInterleave,
            docsIfDownChannelPower,
            docsIfUpChannelId,
            docsIfUpChannelFrequency,
            docsIfUpChannelWidth,
            docsIfUpChannelModulationProfile,
            docsIfUpChannelSlotSize,
            docsIfUpChannelTxTimingOffset,
            docsIfUpChannelRangingBackoffStart,
            docsIfUpChannelRangingBackoffEnd,
            docsIfUpChannelTxBackoffStart,
            docsIfUpChannelTxBackoffEnd,
            docsIfQosProfPriority,
            docsIfQosProfMaxUpBandwidth,
            docsIfQosProfGuarUpBandwidth,
            docsIfQosProfMaxDownBandwidth,
            docsIfQosProfMaxTxBurst,
            docsIfQosProfBaselinePrivacy,
            docsIfQosProfStatus,
            docsIfSigQIncludesContention,
            docsIfSigQUnerroreds,
            docsIfSigQCorrecteds,
            docsIfSigQUncorrectables,
            docsIfSigQSignalNoise,
            docsIfSigQMicroreflections,
            docsIfSigQEqualizationData
        }
        STATUS      current
        DESCRIPTION
            "Group of objects implemented in both Cable Modems and
             Cable Modem Termination Systems."
        ::= { docsIfGroups 1 }

-- The following  table was modified to correct naming conventions for
-- Counter32 variables.
docsIfCmGroup OBJECT-GROUP
        OBJECTS {
            docsIfCmCmtsAddress,
            docsIfCmCapabilities,
--          docsIfCmRangingRespTimeout,
            docsIfCmRangingTimeout,
            docsIfCmStatusValue,
            docsIfCmStatusCode,
            docsIfCmStatusTxPower,
```

```
                docsIfCmStatusResets,
                docsIfCmStatusLostSyncs,
                docsIfCmStatusInvalidMaps,
                docsIfCmStatusInvalidUcds,
--              docsIfCmStatusInvalidRangingResp,
                docsIfCmStatusInvalidRangingResponses,
--              docsIfCmStatusInvalidRegistrationResp,
                docsIfCmStatusInvalidRegistrationResponses,
                docsIfCmStatusT1Timeouts,
                docsIfCmStatusT2Timeouts,
                docsIfCmStatusT3Timeouts,
                docsIfCmStatusT4Timeouts,
                docsIfCmStatusRangingAborteds,
                docsIfCmServiceQosProfile,
                docsIfCmServiceTxSlotsImmed,
                docsIfCmServiceTxSlotsDed,
                docsIfCmServiceTxRetries,
--              docsIfCmServiceTxExceeded,
                docsIfCmServiceTxExceededs,
                docsIfCmServiceRqRetries,
--              docsIfCmServiceRqExceeded
                docsIfCmServiceRqExceededs
            }
        STATUS      current
        DESCRIPTION
            "Group of objects implemented in Cable Modems."
        ::= { docsIfGroups 2 }

docsIfCmtsGroup OBJECT-GROUP
        OBJECTS {
            docsIfCmtsCapabilities,
            docsIfCmtsSyncInterval,
            docsIfCmtsUcdInterval,
            docsIfCmtsMaxServiceIds,
--              docsIfCmtsInsertionInterval,
            docsIfCmtsInvitedRangingAttempts,
            docsIfCmtsInsertInterval,
            docsIfCmtsStatusInvalidRangeReqs,
            docsIfCmtsStatusRangingAborteds,
            docsIfCmtsStatusInvalidRegReqs,
            docsIfCmtsStatusFailedRegReqs,
            docsIfCmtsStatusInvalidDataReqs,
            docsIfCmtsStatusT5Timeouts,
            docsIfCmtsCmStatusMacAddress,
            docsIfCmtsCmStatusIpAddress,
            docsIfCmtsCmStatusDownChannelIfIndex,
            docsIfCmtsCmStatusUpChannelIfIndex,
            docsIfCmtsCmStatusRxPower,
```

```
            docsIfCmtsCmStatusTimingOffset,
            docsIfCmtsCmStatusEqualizationData,
            docsIfCmtsCmStatusValue,
            docsIfCmtsCmStatusUnerroreds,
            docsIfCmtsCmStatusCorrecteds,
            docsIfCmtsCmStatusUncorrectables,
            docsIfCmtsCmStatusSignalNoise,
            docsIfCmtsCmStatusMicroreflections,
            docsIfCmtsServiceCmStatusIndex,
            docsIfCmtsServiceAdminStatus,
            docsIfCmtsServiceQosProfile,
            docsIfCmtsServiceCreateTime,
            docsIfCmtsServiceInOctets,
            docsIfCmtsServiceInPackets,
            docsIfCmtsModType,
            docsIfCmtsModControl,
            docsIfCmtsModPreambleLen,
            docsIfCmtsModDifferentialEncoding,
            docsIfCmtsModFECErrorCorrection,
            docsIfCmtsModFECCodewordLength,
            docsIfCmtsModScramblerSeed,
            docsIfCmtsModMaxBurstSize,
            docsIfCmtsModGuardTimeSize,
            docsIfCmtsModLastCodewordShortened,
            docsIfCmtsModScrambler,
            docsIfCmtsQosProfilePermissions,
            docsIfCmtsCmPtr
        }
        STATUS      current
        DESCRIPTION
            "Group of objects implemented in Cable Modem Termination
             Systems."
        ::= { docsIfGroups 3 }


docsIfObsoleteGroup OBJECT-GROUP
     OBJECTS {
            docsIfCmRangingRespTimeout,
            docsIfCmtsInsertionInterval
        }
        STATUS      obsolete
        DESCRIPTION
            "Group of objects obsoleted."
        ::= { docsIfGroups 4 }


END
```

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         Systems", RFC2669, August 1999.

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7. Security Considerations

   This MIB relates to a system which will provide metropolitan public
   internet access. As such, improper manipulation of the objects
   represented by this MIB may result in denial of service to a large
   number of end-users. In addition, manipulation of the
   docsIfCmServiceQosProfile, docsIfCmtsServerQosProfile, and the
   elements of docsIfQosProfileTable may allow an end-user to improve
   their service response or decrease other subscriber service response.

This MIB does not affect confidentiality, authentication or
authorization of services on a cable modem system. For
authentication and authorization, please see the related document
"Cable Device Management Information Base for DOCSIS compliant Cable
Modems and Cable Modem Termination Systems" [18]. For
confidentiality, the working group expects to issue a MIB which
describes the management of the DOCSIS Baseline Privacy mechanism.

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Acknowledgement