

Network Working Group
Request for Comments: 2670
Category: Proposed Standard

M. St. Johns, Ed.
@Home Network
August 1999

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.

Copyright Notice

Copyright (C) The Internet Society (1999). All Rights Reserved.

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	3
2 Glossary	4
2.1 CATV	4
2.2 Channel	4
2.3 CM	4
2.4 CMTS	4
2.5 Codeword	4
2.6 Data Packet	4

2.7 dBmV	4
2.8 DOCSIS	5
2.9 Downstream	5
2.10 Head-end	5
2.11 MAC Packet	5
2.12 MCNS	5
2.13 Mini-slot	5
2.14 QPSK	5
2.15 QAM	5
2.16 RF	5
2.17 Symbol-times	5
2.18 Upstream	6
3 Overview	6
3.1 Structure of the MIB	6
3.1.1 docsIfBaseObjects	6
3.1.2 docsIfCmObjects	7
3.1.3 docsIfCmtsObjects	7
3.2 Relationship to the Interfaces MIB	7
3.2.1 Layering Model	7
3.2.2 Virtual Circuits	8
3.2.3 ifTestTable	9
3.2.4 ifRcvAddressTable	9
3.2.5 ifEntry	9
3.2.5.1 ifEntry for Downstream interfaces	9
3.2.5.1.1 ifEntry for Downstream interfaces in Cable Modem Termination Systems	9
3.2.5.1.2 ifEntry for Downstream interfaces in Cable Modems	11
3.2.5.2 ifEntry for Upstream interfaces	12
3.2.5.2.1 ifEntry for Upstream interfaces in Cable Modem Termination Systems	12
3.2.5.2.2 ifEntry for Upstream interfaces in Cable Modems	14
3.2.5.3 ifEntry for the MAC Layer	15
4 Definitions	18
5 Acknowledgments	69
6 References	69
7 Security Considerations	70
8 Intellectual Property	71
9 Author's Address	71
10 Full Copyright Statement	72

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 Forward 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 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.

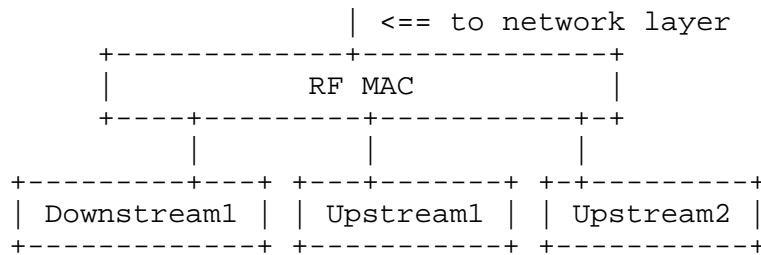
3.2. Relationship to the Interfaces MIB

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.



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:  stjohs@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 CMTs."
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,
docsIfCmStatusLostSynchs	Counter32,
docsIfCmStatusInvalidMaps	Counter32,
docsIfCmStatusInvalidUcds	Counter32,
-- docsIfCmStatusInvalidRangingResp	Counter32,
docsIfCmStatusInvalidRangingResponses	Counter32,
-- docsIfCmStatusInvalidRegistrationResp	Counter32,
docsIfCmStatusInvalidRegistrationResponses	Counter32,
docsIfCmStatusT1Timeouts	Counter32,
docsIfCmStatusT2Timeouts	Counter32,
docsIfCmStatusT3Timeouts	Counter32,
docsIfCmStatusT4Timeouts	Counter32,
docsIfCmStatusRangingAborted	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 }

docsIfCmStatusRangingAbortedDs 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
 docsIfCmtsStatusRangingAborted

Counter32,
 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 }

```

docsIfCmtsStatusRangingAbortedReqs 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 perceived 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 message 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 }

docsIfCmtsCmStatusUnerrored 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 }

docsIfCmtsCmStatusCorrected 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,
docsIfCmStatusRangingAbortedds,
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,
docsIfCmtsStatusRangingAbortedds,
docsIfCmtsStatusInvalidRegReqs,
docsIfCmtsStatusFailedRegReqs,
docsIfCmtsStatusInvalidDataReqs,
docsIfCmtsStatusT5Timeouts,
docsIfCmtsCmStatusMacAddress,
docsIfCmtsCmStatusIpAddress,
docsIfCmtsCmStatusDownChannelIfIndex,
docsIfCmtsCmStatusUpChannelIfIndex,
docsIfCmtsCmStatusRxPower,

```

```

docsIfCmtsCmStatusTimingOffset,
docsIfCmtsCmStatusEqualizationData,
docsIfCmtsCmStatusValue,
docsIfCmtsCmStatusUnerrored,
docsIfCmtsCmStatusCorrected,
docsIfCmtsCmStatusUncorrectable,
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

5. Acknowledgments

This document was produced by the IPCDN Working Group. It is based on a document written by Pam Anderson from CableLabs, Wilson Sawyer from BayNetworks, and Rich Woundy from Continental Cablevision. The original working group editor, Guenter Roeck of cisco Systems, did much of the grunt work of putting the document into its current form.

Special thanks is also due to Azlina Palmer, who helped a lot reviewing the document.

6. References

- [1] Harrington, D., Presuhn, R. and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", RFC 2571, April 1999.
- [2] Rose, M. and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based Internets", STD 16, RFC 1155, May 1990.
- [3] Rose, M. and K. McCloghrie, "Concise MIB Definitions", STD 16, RFC 1212, March 1991.
- [4] Rose, M., "A Convention for Defining Traps for use with the SNMP", RFC 1215, March 1991.
- [5] McCloghrie, K., Perkins, D. and J. Schoenwaelder, "Structure of Management Information for Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [6] McCloghrie, K., Perkins, D. and J. Schoenwaelder, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
- [7] McCloghrie, K., Perkins, D. and J. Schoenwaelder, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.
- [8] Case, J., Fedor, M., Schoffstall, M. and J. Davin, "Simple Management Protocol", STD 15, RFC 1157, May 1990.
- [9] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Introduction to Community-based SNMPv2", RFC 1901, January 1996.
- [10] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Transport Mappings for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1906, January 1996.

- [11] Case, J., Harrington D., Presuhn R. and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", RFC 2572, April 1999.
- [12] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", RFC 2574, April 1999.
- [13] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1905, January 1996.
- [14] Levi, D., Meyer, P. and B. Stewart, "SNMP Applications", RFC 2573, April 1999.
- [15] Wijnen, B., Presuhn, R. and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", RFC 2575, April 1999.
- [16] "Data-Over-Cable Service Interface Specifications: Cable Modem Radio Frequency Interface Specification SP-RFI-I04-980724", DOCSIS, July 1998, <http://www.cablemodem.com/public/pubtechspec/SP-RFI-I04-980724.pdf>.
- [17] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB using SMIV2", RFC 2233, November 1997.
- [18] StJohns, M. , "Cable Device Management Information Base for DOCSIS Compliant Cable Modems and Cable Modem Termination Systems", RFC2669, August 1999.
- [19] Proakis, John G., "Digital Communications, 3rd Edition", McGraw-Hill, New York, New York, 1995, ISBN 0-07-051726-6
- [20] "Transmission Systems for Interactive Cable Television Services, Annex B", J.112, International Telecommunications Union, March 1998.

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.

8. Intellectual Property

The IETF takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on the IETF's procedures with respect to rights in standards-track and standards-related documentation can be found in BCP-11. Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementors or users of this specification can be obtained from the IETF Secretariat.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights which may cover technology that may be required to practice this standard. Please address the information to the IETF Executive Director.

9. Author's Address

Michael StJohns
@Home Network
425 Broadway
Redwood City, CA 94063

Phone: +1 650 569 5368
EMail: stjohns@corp.home.net

10. Full Copyright Statement

Copyright (C) The Internet Society (1999). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Acknowledgement

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

