

Network Working Group
Request for Comments: 4546
Obsoletes: 2670
Category: Standards Track

D. Raftus
ATI Technologies, Inc.
E. Cardona
CableLabs
June 2006

Radio Frequency (RF) Interface Management Information Base
for Data over Cable Service Interface Specifications (DOCSIS) 2.0
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.

This document revises and obsoletes RFC 2670. Please see Section 5.3 for a description of the changes from RFC 2670.

Copyright Notice

Copyright (C) The Internet Society (2006).

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 set of managed objects for Simple Network Management Protocol (SNMP) based management of the Radio Frequency (RF) interfaces for systems compliant with the Data Over Cable Service Interface Specifications (DOCSIS).

Table of Contents

1. The Internet-Standard Management Framework	2
2. Glossary	3
2.1. Baseline Privacy	3
2.2. CATV	3
2.3. Channel	3
2.4. CM or Cable Modem	3
2.5. CMTS or Cable Modem Termination System	3
2.6. Codeword	4
2.7. Data Packet	4
2.8. dBmV	4
2.9. DOCSIS	4

2.9.1. DOCSIS 1.0	4
2.9.2. DOCSIS 1.1	4
2.9.3. DOCSIS 2.0	4
2.10. Downstream	5
2.11. Euro-DOCSIS	5
2.12. Head-end	5
2.13. MAC Packet	5
2.14. MCNS	5
2.15. Mini-slot	5
2.16. QPSK (Quadrature Phase Shift Keying)	5
2.17. QAM (Quadrature Amplitude Modulation)	5
2.18. RF	5
2.19. Symbol-times	5
2.20. Upstream	6
3. Overview	6
3.1. Textual Conventions	6
3.1.1. Textual Conventions in RFC 2670	6
3.1.2. Textual Conventions in RFC 4546	6
3.2. Structure of the MIB	6
3.2.1. docsIfBaseObjects	7
3.2.2. docsIfCmObjects	7
3.2.3. docsIfCmtsObjects	8
3.2.4. Relationship to the Interfaces MIB Module	8
3.2.5. Offline Upstream Parameters Handling	22
4. Definitions	24
5. Revision History	134
5.1. Scope	134
5.2. Extension	134
6. Security Considerations	134
7. Management Interoperability of DOCSIS 1.0, 1.1, and 2.0	136
8. References	136
8.1. Normative References	136
8.2. Informative References	137

1. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] STD 58, RFC 2580 [RFC2580].

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. Baseline Privacy

Security interface specification, designed for DOCSIS-compliant cable data systems, that ensures device authentication data confidentiality in the CATV plant. See [BPI] and [BPIPLUS].

2.2. CATV

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

2.3. 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 downstream 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.

For European cable systems, upstream channels vary by country. The upper edge of upstream channel allocations varies between 25 MHz to 65 MHz, and the lower edge of downstream channel allocations varies between 47 MHz and 87.5 MHz. The typical broadcast channel width in Europe is 8MHz. The actual parameters are of concern to systems deploying Euro-DOCSIS technology.

The downstream channels conform to the requirements of ITU-T Recommendation J.83 [ITU-T_J.83]

2.4. CM or Cable Modem

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

2.5. CMTS or 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.

2.6. Codeword

A characteristic of the Forward Error Correction scheme, used above the RF media layer.

See "Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFiv2.0-I10-051209".

2.7. Data Packet

The payload portion of the MAC Packet.

2.8. dBmV

A measure of RF signal voltage amplitude, whose power level is determined by the characteristic impedance. A zero dB signal power is equivalent to 48.75 dBmV signal amplitude in a 75 Ohm system.

2.9. DOCSIS

"Data Over Cable Service Interface Specification". A term referring to the ITU-T J112 [ITU-T_J.112] Annex B standard for cable modem systems.

2.9.1. DOCSIS 1.0

Cable modem systems that are CM/CMTS compliant to requirements in [RFI1.0]. A common reference to DOCSIS 1.0 in this document is the upstream channel queuing mechanism, known as Class of Service (COS).

2.9.2. DOCSIS 1.1

Cable modem systems that are CM/CMTS compliant to requirements in [ITU-T_J.112]. DOCSIS 1.1 references in this document are in part associated with the upstream and downstream Quality of Service (QoS). The term DOCSIS 1.x is used in this document to refer to both DOCSIS 1.0 and DOCSIS 1.1.

2.9.3. DOCSIS 2.0

Cable modem systems that are CM/CMTS compliant to requirements in [ITU-T_J.122]. DOCSIS 2.0 corresponds to the second generation of radio-frequency interface specifications of DOCSIS.

2.10. Downstream

The direction from the head-end towards the subscriber.

2.11. Euro-DOCSIS

Cable modem systems CM/CMTS that conform to the European spectrum lineup and are compliant to requirements of Annex F in [ITU-T_J.122].

2.12. Head-end

The origination point in most cable systems of the subscriber video signals. Generally also the location of the CMTS equipment.

2.13. MAC Packet

A DOCSIS PDU.

2.14. MCNS

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

2.15. Mini-slot

In general, an interval of time that is allocated by the CMTS to a given CM for that CM to transmit in an upstream direction. See [ITU-T_J.122]

2.16. QPSK (Quadrature Phase Shift Keying)

A particular modulation scheme on an RF medium. See [Proakis00].

2.17. QAM (Quadrature Amplitude Modulation)

A particular modulation scheme on RF medium. Usually expressed with a number indicating the size of the modulation constellation (e.g., 16 QAM). See [Proakis00].

2.18. RF

Radio Frequency.

2.19. Symbol-times

A characteristic of the RF modulation scheme. See [ITU-T_J.122].

2.20. Upstream

The direction from the subscriber towards the head-end.

3. Overview

This MIB module provides a set of objects required for the management of 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 [ITU-T_J.122].

In this document, the key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" are to be interpreted as described in [RFC2119].

3.1. Textual Conventions

This MIB module defines new textual conventions for CM and CMTS indications of DOCSIS 2.0 RFI capabilities, configuration, usage, and backward compatible modes of operation, as defined in [RFI2.0]. With the same purpose, there are some textual conventions that represent capabilities and modes of operation of [RFI1.1] that are not covered by RFC 2670, and are managed proprietarily in the DOCSIS OSSI 1.1 specification [OSSI1.1].

3.1.1. Textual Conventions in RFC 2670

RFC 2670 defined two textual conventions, TenthdBmV and TenthdB, which are power measurement representations.

3.1.2. Textual Conventions in RFC 4546

This MIB module defines the textual convention DocsisUpstreamType to represent the DOCSIS 1.0 [RFI1.0] and DOCSIS 2.0 [RFI2.0] upstream burst modulation profiles types.

This MIB module defines the textual conventions DocsisVersion and DocsisQosVersion to represent the DOCSIS 1.0 [RFI1.0] and DOCSIS 1.1 [RFI1.1] COS/QOS capabilities and modes of operation.

3.2. Structure of the MIB

This MIB module is structured as three groups:

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

- o Management information pertinent to Cable Modem only (docsIfCmObjects).
- o Management information pertinent to Cable Modem Termination System only (docsIfCmtsObjects).

Tables within each of these groups cover different functions; e.g., upstream queue services, 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.

3.2.1. docsIfBaseObjects

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

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

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

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

docsIfDocsisBaseCapability - This object is used to indicate the highest level of DOCSIS version a cable device can support.

3.2.2. docsIfCmObjects

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

docsIfCmStatusTable - This table maintains a number of status objects and counters for cable modems. There is a comparable table at the CMTS, docsIfCmtsCmStatusTable, which maintains similar counters from the CMTS point of view.

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.

3.2.3. docsIfCmtsObjects

docsIfCmtsMacTable - Describes the attributes of each CMTS MAC interface.

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

docsIfCmtsCmStatusTable - This table is used to hold information about known (i.e., ranging, registered, and/or previously online) cable modems on the system serviced by this CMTS.

docsIfCmtsServiceTable - 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.

docsIfCmtsChannelUtilizationTable - This table provides statistical load usage data for attached upstream and downstream physical channels.

docsIfCmtsDownChannelCounterTable - This table provides statistical data for attached downstream channels, appropriate as input for load usage calculations.

docsIfCmtsUpChannelCounterTable - This table provides statistical data for attached upstream channels, appropriate as input for load usage calculations.

3.2.4. Relationship to the Interfaces MIB Module

This section clarifies the relationship of this MIB module to the Interfaces MIB [RFC2863]. Several areas of correlation are addressed in the following subsections. The implementer is referred to the Interfaces MIB document in order to understand the general intent of these areas.

3.2.4.1. Layering Model

An instance of ifEntry exists for each RF downstream interface, for each RF upstream interface, for each upstream logical Channel, and for each RF MAC layer.

The ifStackTable [RFC2863] MUST be implemented to identify the relationships among sub-interfaces.

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

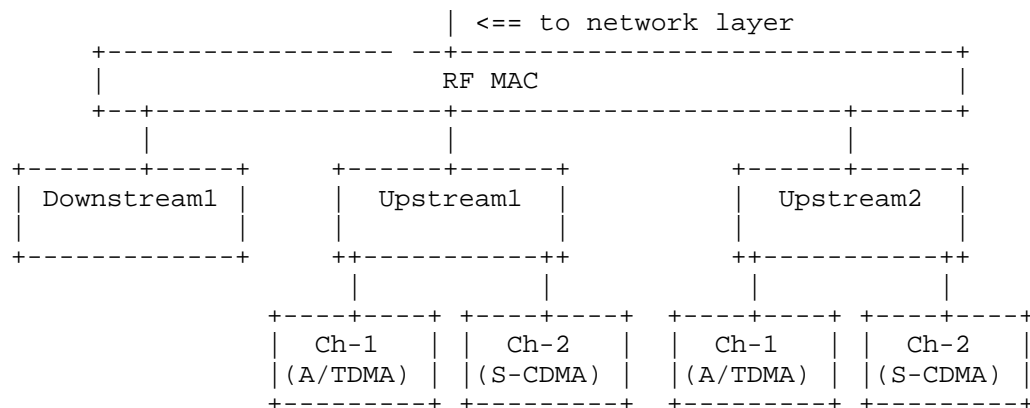


Figure 1

As can be seen from this example, the RF MAC interface is layered on top of the downstream and upstream interfaces, and the RF upstream interface is layered on top of an upstream logical channel.

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

ifIndex	ifType	Description
2	docsCableMacLayer(127)	CATV MAC Layer
3	docsCableDownstream(128)	CATV Downstream interface
4	docsCableUpstream(129)	CATV Upstream interface
5	docsCableUpstream(129)	CATV Upstream interface
6	docsCableUpstreamChannel(205)	CATV Upstream Channel
7	docsCableUpstreamChannel(205)	CATV Upstream Channel
8	docsCableUpstreamChannel(205)	CATV Upstream Channel
9	docsCableUpstreamChannel(205)	CATV Upstream Channel

Figure 2

The corresponding ifStack entries would then be:

IfStackHigherLayer	ifStackLowerLayer
0	2
2	3
2	4
2	5
4	6
4	7
5	8
5	9
3	0
6	0
7	0
8	0
9	0

Figure 3

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 cable channels, 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) management is outside the scope of this document.

3.2.4.2. Virtual Circuits

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

3.2.4.3. ifTestTable

The ifTestTable is optional for DOCSIS CM/CMTS implementations, but is not specifically influenced by the RF MIB.

3.2.4.4. ifRcvAddressTable

The ifRcvAddressTable is optional for DOCSIS CM/CMTS implementations, but is not specifically influenced by the RF MIB.

3.2.4.5. ifEntry

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

3.2.4.5.1. ifEntry for Downstream Interfaces

The ifEntry for downstream interfaces supports the ifGeneralInformationGroup and the ifPacketGroup of the Interfaces MIB module. 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.

3.2.4.5.1.1. ifEntry for Downstream Interfaces in Cable Modem Termination System

ifTable	Comments
=====	=====
ifIndex	Each CATV 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 is the raw bandwidth in bits/s of this interface. This is the symbol rate multiplied with the number of bits per symbol.
ifHighSpeed	Return the speed of this downstream channel. The returned value is the raw bandwidth in megabits/s of this interface. This is the symbol rate multiplied with the number of bits per symbol.
ifPhysAddress	Return the zero-length OCTET STRING.
ifAdminStatus	The administrative status of this interface.
ifOperStatus	The current operational status of this interface.
ifMtu	The size of the largest frame that can be sent on this interface, specified in octets. The value includes the length of the MAC header.
ifInOctets	
ifHCInOctets	Return zero.

```

ifInUcastPkts      Return zero.

ifInMulticastPkts
ifHCInMulticastPkts      Return zero.

ifInBroadcastPkts
ifHCInBroadcastPkts      Return zero.

ifInDiscards      Return zero.

ifInErrors      Return zero.

ifInUnknownProtos Return zero.

ifOutOctets
ifHCOctets      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
ifHCOutUcastPkts  The number of unicast packets transmitted on this
                  interface. This includes MAC packets as well as
                  data packets.

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

ifOutBroadcastPkts
ifHCOutBroadcastPkts      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 that could not be
                           transmitted due to errors.

ifPromiscuousMode Return false.

```

3.2.4.5.1.2. ifEntry for Downstream Interfaces in Cable Modem

ifTable	Comments
=====	=====
ifIndex	Each CATV 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.
ifHighSpeed	Return the speed of this downstream channel. The returned value the raw bandwidth in megabits/s of this interface. This is the symbol rate multiplied with the number of bits per symbol.
ifPhysAddress	Return the zero-length OCTET STRING.
ifAdminStatus	The administrative status of this interface.
ifOperStatus	The current operational status of this interface.
ifMtu	The size of the largest frame that 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 packets, and includes the length of the MAC header.
ifHCInOctets	
ifInUcastPkts	The number of unicast packets received on this interface. This includes data packets as well as MAC packets.
ifHCInUcastPkts	
ifInMulticastPkts	Return the number of multicast packets received on this interface. This includes data packets as well as MAC packets.
ifHCInMulticastPkts	

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

ifInDiscards The total number of received packets that 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.
ifHCOutOctets

ifOutUcastPkts Return zero.
ifHCOutUcastPkts

ifOutMulticastPkts
ifHCOutMulticastPkts Return zero.

ifOutBroadcastPkts
ifHCOutBroadcastPkts Return zero.

ifOutDiscards Return zero.

ifOutErrors Return zero.

ifPromiscuousMode Refer to the Interfaces MIB.

3.2.4.5.2. ifEntry for Upstream Interfaces

Each supported interface of the type docsCableUpstream(129) must have a corresponding ifEntry. 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.

3.2.4.5.2.1. ifEntry for Upstream Interfaces in Cable Modem Termination System

ifTable	Comments
=====	=====
ifIndex	Each RF Cable Upstream interface is represented by an ifEntry.
ifType	The IANA value of docsCableUpstream (129).
ifSpeed	Return the maximum channel throughput (not payload throughput) supported by the interface. The maximum throughput is calculated for the case where upstream channels are configured to maximize interface throughput.
ifHighSpeed	Return the maximum channel throughput (not payload throughput) supported by the interface. The maximum throughput is calculated for the case where upstream channels are configured to maximize interface throughput. Units for this object are (1/1 000 000) * IfSpeed.
ifPhysAddress	Return the zero-length OCTET STRING.
ifAdminStatus	The administrative status of this interface.
ifOperStatus	The current operational status of this interface. This reflects the total status of all the channels under this interface. So if at least one channel has a physical connection this interface has connection.
ifMtu	The size of the largest frame that can be transmitted on this interface, specified in octets. The value includes the length of the MAC header. This is the maximum of all the ifMtu of all the channels under this interface.
ifInOctets	The total (sum) number of octets received on all the upstream channels under this interface. This includes data packets as well as MAC packets, and includes the length of the MAC header.
ifHCInOctets	

ifInUcastPkts
ifHCInUcastPkts The total number of unicast packets received on all the upstream channels under this interface. This includes data packets as well as MAC packets.

ifInMulticastPkts
ifHCInMulticastPkts Return the total number of multicast packets received on all the upstream channels under this interface. This includes data packets as well as MAC layer packets.

ifInBroadcastPkts
ifHCInBroadcastPkts Return the total number of broadcast packets received on all the upstream channels under this interface. This includes data packets as well as MAC packets.

ifInDiscards The total number of received packets that have been discarded on all the upstream channels under this interface.
The possible reasons are: buffer shortage.

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

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

ifOutOctets
ifHCOutOctets Return zero.

ifOutUcastPkts
ifHCOutOctets Return zero.

ifOutMulticastPkts
ifHCOutMulticastPkts Return zero.

ifOutBroadcastPkts
ifHCOutBroadcastPkts Return zero.

ifOutDiscards Return zero.

ifOutErrors Return zero.

3.2.4.5.2.2. ifEntry for Upstream Interfaces in Cable Modem

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 interface. The returned value is the raw bandwidth in bits/s of this interface.
ifHighSpeed	Return the speed of this upstream interface. The returned value is the raw bandwidth in megabits/s of this interface.
ifPhysAddress	Return the zero-length OCTET STRING.
ifAdminStatus	The administrative status of this interface.
ifOperStatus	The current operational status of this interface.
ifMtu	The size of the largest frame that can be transmitted on this interface, specified in octets. The value includes the length of the MAC header.
ifInOctets	Return zero.
ifHCInOctets	
ifInUcastPkts	Return zero.
ifHCInUcastPkts	
ifInMulticastPkts	
ifHCInMulticastPkts	Return zero.
ifInBroadcastPkts	
ifHCInBroadcastPkts	Return zero.
ifInDiscards	Return zero.

ifInErrors Return zero.

ifInUnknownProtos Return zero.

ifOutOctets
ifHCOctets 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
ifHCOctetsUcastPkts The number of unicast packets transmitted on this
 interface. This includes MAC packets as well as
 data packets.

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

ifOutBroadcastPkts
ifHCOctetsBroadcastPkts 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 that
 were discarded. Possible reasons are:
 buffer shortage.

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

ifPromiscuousMode Return false.

3.2.4.5.3. ifEntry for Upstream Channels

Each supported channel of the type docsCableUpstreamChannel(205) must have a corresponding ifEntry.

The ifEntry for upstream channels 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. DOCSIS CMs are not required to support logical upstream channels.

3.2.4.5.3.1. ifEntry for Upstream Channels in Cable Modem Termination System

ifTable	Comments
=====	=====
ifIndex	Each RF Cable Upstream channel is represented by an ifEntry.
ifType	The IANA value of docsCableUpstreamChannel (205).
ifSpeed	Return the speed of this upstream channel. The returned value is the raw bandwidth in bits/s of this channel.
ifHighSpeed	Return the speed of this upstream channel. The returned value is the raw bandwidth in megabits/s of this channel.
ifPhysAddress	Return the zero-length OCTET STRING.
ifAdminStatus	The administrative status of this interface.
ifOperStatus	The current operational status of this interface.
ifMtu	The size of the largest frame that 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 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 packets.
ifHCInUcastPkts	
ifInMulticastPkts	Return the number of multicast packets received on this interface. This includes data packets as well as MAC layer packets.
ifHCInMulticastPkts	

ifInBroadcastPkts	
ifHCInBroadcastPkts	Return the number of broadcast packets received on this interface. This includes data packets as well as MAC packets.
ifInDiscards	The total number of received packets that 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.
ifHCOutOctets	
ifOutUcastPkts	Return zero.
ifHCOutUcastPkts	
ifOutMulticastPkts	
ifHCOutMulticastPkts	Return zero.
ifOutBroadcastPkts	
ifHCOutBroadcastPkts	Return zero.
ifOutDiscards	Return zero.
ifOutErrors	Return zero.

3.2.4.5.4. 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 ifHCInOctets	The total number of data octets received on this interface, targeted for upper protocol layers.
ifInUcastPkts ifHCInUcastPkts	The number of unicast packets received on this interface, targeted for upper protocol layers.
ifInMulticastPkts ifHCInMulticastPkts	Return the number of multicast packets received on this interface, targeted for upper protocol layers.
ifInBroadcastPkts ifHCInBroadcastPkts	Return the number of broadcast packets received on this interface, targeted for upper protocol layers.
ifInDiscards	The total number of received packets that 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
ifHCOctets protocol layers and transmitted on this interface.

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

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

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

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

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

ifPromiscuousMode Refer to the Interfaces MIB.

3.2.5. Offline Upstream Parameters Handling

3.2.5.1. Overview

This section describes the offline configuration of the DOCSIS 2.0 upstream logical interface parameters. The purpose of this feature is to guarantee that upstream logical interface parameters (such as modulation profile, channel type, mini-slot size, and SCDMA attributes) are consistent prior to committing changes to an active upstream logical interface. This mechanism can reduce possible downtime of the upstream interface by minimizing SNMP SET operations to in-service upstream interfaces. This mechanism is supported by CMTSs and is not applicable to CMs.

3.2.5.2. Operation

This mechanism uses three upstream channel MIB objects defined for DOCSIS 2.0 CMTS implementations:

`docsIfUpChannelStatus` - The `RowStatus` object for the creation of temporary interfaces in the upstream interface table. A temporary entry is used to modify, validate, and commit upstream parameters of a physical interface. In the CMTS, a physical upstream interface refers to an upstream logical channel interface.

`docsIfUpChannelCloneFrom` - This MIB object associates a physical interface with a temporary interface for the purpose of updating the upstream parameters of the physical interface.

`docsIfUpChannelUpdate` - This MIB object is the commit object that transfers the validated upstream parameters from the temporary interface to the physical interface.

The offline upstream parameters handling operation is as follows:

- o A temporary interface is created in which `docsIfUpChannelStatus` is set to `'createAndWait'`, which turns the new create entry status to `'notReady'`.
- o A SET to `docsIfUpChannelCloneFrom` in the temporary interface to the physical interface `ifIndex` value performs two actions:
 - * Creates the association of the physical interface to the temporary interface.
 - * Copies the original upstream parameters from the physical interface to the temporary interface, which turns its status to `'notInService'`.
- o The operator modifies the temporary interface parameters to the desired values.
- o At this point, a SET to `'active'` to the `RowStatus` of the temporary interface is successful if all parameters in the temporary interface are valid for the associated physical interface; otherwise, the temporary entry remains with status `'notInService'`, and the SET returns the error `'commitFailed'`.
- o When the temporary interface status is `'active'`, a SET to `docsIfUpChannelUpdate` to `'true'` transfers the temporary interface parameters values to the physical interface.
- o After completion of the update operations, the temporary interface is destroyed, setting the `docsIfUpChannelStatus` to `'destroy'`.

3.2.5.3. Relation of docsIfUpChannelStatus and ifMib

The main purpose of docsIfUpChannelStatus is the creation of temporary interfaces for offline handling of the configuration of physical interfaces; it does not manage the creation or control of physical interfaces. To maintain a consistent operation and status report of interfaces, this object does not manage the administrative and operational status of physical interfaces.

4. Definitions

```
DOCS-IF-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    Unsigned32,
    Integer32,
    Counter32,
    Counter64,
    TimeTicks,
    IpAddress,
    transmission
        FROM SNMPv2-SMI          -- [RFC2578]
    TEXTUAL-CONVENTION,
    MacAddress,
    RowStatus,
    TruthValue,
    TimeInterval,
    TimeStamp,
    StorageType
        FROM SNMPv2-TC          -- [RFC2579]
    OBJECT-GROUP,

    MODULE-COMPLIANCE
        FROM SNMPv2-CONF        -- [RFC2580]
    ifIndex, InterfaceIndexOrZero
        FROM IF-MIB             -- [RFC2863]
    InetAddressType,
    InetAddress
        FROM INET-ADDRESS-MIB   -- [RFC4001]
    IANAifType
        FROM IANAifType-MIB;    -- [IANA]

docsIfMib MODULE-IDENTITY
    LAST-UPDATED      "200605240000Z" -- May 24, 2006
    ORGANIZATION      "IETF IPCDN Working Group"
    CONTACT-INFO
```


" David Raftus
Postal: ATI Technologies Inc.
340 Terry Fox Drive, Suite 202
Ottawa Ontario
Canada
Phone: +1 613 592 1052 ext.222
E-mail: david.raftus@ati.com

Eduardo Cardona
Postal: Cable Television Laboratories, Inc.
858 Coal Creek Circle
Louisville, CO 80027-9750
U.S.A.
Phone: Tel: +1 303 661 9100
Fax: +1 303 661 9199
E-mail: e.cardona@cablelabs.com;mibs@cablelabs.com

IETF IPCDN Working Group
General Discussion: ipcdn@ietf.org
Subscribe: <http://www.ietf.org/mailman/listinfo/ipcdn>
Archive: <ftp://ftp.ietf.org/ietf-mail-archive/ipcdn>
Co-chairs: Richard Woundy, Richard_Woundy@cable.comcast.com
Jean-Francois Mule, jf.mule@cablelabs.com"

DESCRIPTION

"This is the MIB Module for DOCSIS 2.0-compliant Radio Frequency (RF) interfaces in Cable Modems and Cable Modem Termination Systems.

Copyright (C) The Internet Society (2006). This version of this MIB module is part of RFC 4546; see the RFC itself for full legal notices."

REVISION "200605240000Z"

DESCRIPTION

"Revision of the IETF RF MIB module for DOCSIS 2.0. This version published as RFC 4546. This MIB module revision includes the following among others:
Usage of ifType (205) for upstream logical channels.
Addition of downstream and upstream utilization counters.
Additional statistics per upstream interface.
Upstream channel offline configuration mechanism.
Added MIB support for new DOCSIS 2.0 modulation attributes.
Euro-DOCSIS downstream interleave values.
Adjustments to RFC 2670 definitions based on the MIB review guidelines from the IETF

Operations and Management Area (OPS)."

REVISION "199908190000Z"

DESCRIPTION

"Initial version, published as RFC 2670.
Modified by Mike St. Johns 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 with 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

DocsisVersion ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"Indicates the DOCSIS Radio Frequency specification being
referenced.

'docsis10' indicates DOCSIS 1.0.

'docsis11' indicates DOCSIS 1.1.

'docsis20' indicates DOCSIS 2.0."

SYNTAX INTEGER {

docsis10 (1),

docsis11 (2),

docsis20 (3)

}

DocsisQosVersion ::= TEXTUAL-CONVENTION

```

STATUS          current
DESCRIPTION
    "Indicates the referenced quality-of-service
    level.
    'docsis10' refers to DOCSIS 1.0 Class of
    Service queuing services, and 'docsis11' refers
    to DOCSIS 1.1 Quality of Service."
SYNTAX          INTEGER {
    docsis10 (1),
    docsis11 (2)
}

```

DocsisUpstreamType ::= TEXTUAL-CONVENTION

```

STATUS          current
DESCRIPTION
    "Indicates the DOCSIS Upstream Channel Type.
    'unknown' means information not available.
    'tdma' is related to TDMA, Time Division
    Multiple Access; 'atdma' is related to A-TDMA,
    Advanced Time Division Multiple Access,
    'scdma' is related to S-CDMA, Synchronous
    Code Division Multiple Access.
    'tdmaAndAtdma' is related to simultaneous support of
    TDMA and A-TDMA modes."
SYNTAX          INTEGER {
    unknown(0),
    tdma(1),
    atdma(2),
    scdma(3),
    tdmaAndAtdma(4)
}

```

DocsEqualizerData ::= TEXTUAL-CONVENTION

```

STATUS          current
DESCRIPTION
    "This data type represents the equalizer data
    as measured at the receiver interface.
    The format of the equalizer follows the structure of the
    Transmit Equalization Adjust RNG-RSP TLV of DOCSIS RFI
    v2.0 :
    1 byte Main tap location 1..(n + m)
    1 byte Number of forward taps per symbol
    1 byte Number of forward taps: n
    1 byte Number of reverse taps: m

    Following are the equalizer coefficients:
    First, forward taps coefficients:
    2 bytes F1 (real), 2 bytes F1 (imag)

```

...
 2 bytes Fn (real), 2 bytes Fn (imag)

Then, reverse taps coefficients:
 2 bytes D1 (real), 2 bytes D1 (imag)
 ...

2 bytes Dm (real), 2 bytes Dm (imag)

The equalizer coefficients are considered signed 16-bit integers in the range from -32768 (0x8000) to 32767 (0x7FFF).

DOCSIS specifications require up to a maximum of 64 equalizer taps (n + m); therefore, this object size can get up 260 bytes (4 + 4x64).
 The minimum object size (other than zero) for a t-spaced tap with a minimum of 8 symbols will be 36 (4 + 4x8)."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFiv2.0-I10-051209, Figure 8-23."

SYNTAX OCTET STRING(SIZE (0 | 36..260))

```
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
-- and the Cable Modem Termination System. This table is
-- read only for the CM.
--
```

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

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Tables 6-16, and 6-17."
::= { 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,
docsIfDownChannelAnnex	INTEGER,
docsIfDownChannelStorageType	StorageType

}

docsIfDownChannelId OBJECT-TYPE

SYNTAX Integer32 (0..255)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The Cable Modem Termination System 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 frequency. See the associated compliance object for a description of valid frequencies that may be written to this object."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 6.3.3."

::= { 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

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Table 6-17."

::= { 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

"Data-Over-Cable Service Interface Specifications: Radio

Frequency Interface Specification SP-RFIV2.0-I10-051209,
Table 6-17."
 ::= { docsIfDownstreamChannelEntry 4 }

docsIfDownChannelInterleave OBJECT-TYPE

```
SYNTAX      INTEGER {
    unknown(1),
    other(2),
    taps8Increment16(3),
    taps16Increment8(4),
    taps32Increment4(5),
    taps64Increment2(6),
    taps128Increment1(7),
    taps12increment17(8)
}
```

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
taps12increment17(8):	protection 18/14 usec, latency 0.43/0.32 msec

The value 'taps12increment17' is supported by EuroDOCSIS
cable systems only, and the others by DOCSIS cable systems.

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

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,

Table 6-15."
 ::= { 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.
 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
 "Data-Over-Cable Service Interface Specifications: Radio
 Frequency Interface Specification SP-RFIV2.0-I10-051209,
 Tables 6-16, 6-17."
 ::= { docsIfDownstreamChannelEntry 6 }

docsIfDownChannelAnnex OBJECT-TYPE

SYNTAX INTEGER {
 unknown(1),
 other(2),
 annexA(3),
 annexB(4),
 annexC(5)
 }
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "The value of this object indicates the conformance of
 the implementation to important regional cable standards.
 annexA : Annex A from ITU-T J.83 is used.
 (equivalent to EN 300 429)
 annexB : Annex B from ITU-T J.83 is used.
 annexC : Annex C from ITU-T J.83 is used."
 REFERENCE
 "Data-Over-Cable Service Interface Specifications: Radio
 Frequency Interface Specification SP-RFIV2.0-I10-051209,
 Sections 6.3.1, and H.3.1."
 ::= { docsIfDownstreamChannelEntry 7 }

docsIfDownChannelStorageType OBJECT-TYPE

SYNTAX StorageType
 MAX-ACCESS read-only


```
STATUS          current
DESCRIPTION
    "The storage type for this conceptual row.
    Entries with this object set to permanent(4)
    do not require write operations for read-write
    objects."
 ::= { docsIfDownstreamChannelEntry 8 }
```

```
--
-- 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."
    ::= { docsIfBaseObjects 2 }
```

```
docsIfUpstreamChannelEntry OBJECT-TYPE
    SYNTAX          DocsIfUpstreamChannelEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "List of attributes for a single upstream channel.  For
        DOCSIS 2.0 CMTSS, an entry in this table exists for
        each ifEntry with an ifType of docsCableUpstreamChannel
        (205).
        For DOCSIS 1.x CM/CMTSS and DOCSIS 2.0 CMs, an entry in
        this table exists for each ifEntry with an ifType of
        docsCableUpstream (129).
```

For DOCSIS 2.0 CMTSS, two classes of interfaces can be defined for this table:

- o Upstream Physical Interfaces: The traditional DOCSIS 1.x CMTS upstream interface ifType 129 and the DOCSIS 2.0 ifType 205 that are functional. In other words, interfaces that represent upstream receivers within an RF MAC interface. Entries of physical interfaces are exposed to the management interface with their corresponding ifStack hierarchy and are not administratively created by this table.

- o Upstream Temporary Interfaces: A fictitious interface created for the purpose of manipulating physical interface parameters offline, then validating prior to updating the target physical interface.

In case of a reinitialization of the managed system, physical interfaces values persist while the temporary interfaces are not recreated.

This mechanism helps to minimize service disruptions originating in situations where a group of interface parameter values need to be consistent with each other in SET operations. A temporary buffer (temporary interface) is provided to allow the CMTS to validate the parameters offline."

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,
    docsIfUpChannelScdmaActiveCodes   Unsigned32,
    docsIfUpChannelScdmaCodesPerSlot  Integer32,
    docsIfUpChannelScdmaFrameSize     Unsigned32,
    docsIfUpChannelScdmaHoppingSeed   Unsigned32,
    docsIfUpChannelType               DocsisUpstreamType,
    docsIfUpChannelCloneFrom          InterfaceIndexOrZero,
    docsIfUpChannelUpdate              TruthValue,
    docsIfUpChannelStatus              RowStatus,
    docsIfUpChannelPreEqEnable         TruthValue
}
```

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-create

STATUS current

DESCRIPTION

"The center of the frequency band associated with this upstream interface. 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

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFiv2.0-I10-051209, Table 4-2."

::= { docsIfUpstreamChannelEntry 2 }

docsIfUpChannelWidth OBJECT-TYPE

SYNTAX Integer32 (0..64000000)

UNITS "hertz"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The bandwidth of this upstream interface. This object returns 0 if the interface width is undefined or unknown. Minimum permitted interface width is currently 200,000 Hz. See the associated conformance object for write conditions and limitations."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFiv2.0-I10-051209, Table 6-5."

::= { docsIfUpstreamChannelEntry 3 }

docsIfUpChannelModulationProfile OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-create

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 (IUCs) that, together, fully describe the channel modulation. This object returns 0 if the docsIfCmtsModulationTable entry does not exist or is empty. See the associated conformance object for write conditions and limitations."

Setting this object returns an 'inconsistentValue' error if the following conditions are not satisfied:

1. All the IUC entries in the selected modulation profile MUST have the same value of docsIfCmtsModChannelType.
2. All of the Modulation parameters in the selected modulation profile MUST be consistent with the other parameters in this docsIfUpstreamChannelEntry."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Table 8-19."

::= { docsIfUpstreamChannelEntry 4 }

docsIfUpChannelSlotSize OBJECT-TYPE

SYNTAX Unsigned32

UNITS "ticks"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Applicable to TDMA and ATDMA channel types only.
The number of 6.25 microsecond ticks in each upstream mini-slot. Returns zero if the value is undefined or unknown or in case of an SCDMA channel.
See the associated conformance object for write conditions and limitations."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 8.1.2.4."

::= { docsIfUpstreamChannelEntry 5 }

docsIfUpChannelTxTimingOffset OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"At the CM, a measure of the current round trip time obtained from the ranging offset (initial ranging offset + ranging offset adjustments).
At the CMTS, the maximum of timing offset, among all the CMs that are/were present on the channel, taking into account all (initial + periodic) timing offset corrections that were sent for each of the CMs. Generally, these measurements are positive, but if the measurements are negative, the value of this object is zero. Used for timing of CM upstream transmissions to ensure synchronized arrivals at the CMTS.
Units are one 64th fraction of 6.25 microseconds."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 6.2.19."

::= { docsIfUpstreamChannelEntry 6 }

docsIfUpChannelRangingBackoffStart OBJECT-TYPE

SYNTAX Integer32 (0..16)

MAX-ACCESS read-create

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

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Sections 8.3.4, and 9.4."

::= { docsIfUpstreamChannelEntry 7 }

docsIfUpChannelRangingBackoffEnd OBJECT-TYPE

SYNTAX Integer32 (0..16)

MAX-ACCESS read-create

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

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 8.3.4, and 9.4."

::= { docsIfUpstreamChannelEntry 8 }

docsIfUpChannelTxBackoffStart OBJECT-TYPE

SYNTAX Integer32 (0..16)

MAX-ACCESS read-create

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

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 8.3.4, and 9.4."

::= { docsIfUpstreamChannelEntry 9 }

docsIfUpChannelTxBackoffEnd OBJECT-TYPE

SYNTAX Integer32 (0..16)

MAX-ACCESS read-create

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

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 8.3.4, and 9.4."

::= { docsIfUpstreamChannelEntry 10 }

docsIfUpChannelScdmaActiveCodes OBJECT-TYPE

SYNTAX Unsigned32 (0|64..66|68..70|72|74..78|80..82|84..88
|90..96|98..100|102|104..106|108
|110..112|114..126|128)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Applicable for SCDMA channel types only. Number of active codes. Returns zero for Non-SCDMA channel types. Note that legal values from 64..128 MUST be non-prime."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 6.2.11.2.1."

::= { docsIfUpstreamChannelEntry 11 }

docsIfUpChannelScdmaCodesPerSlot OBJECT-TYPE

SYNTAX Integer32(0 | 2..32)

UNITS "codesperMinislots"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Applicable for SCDMA channel types only. The number of SCDMA codes per mini-slot. Returns zero if the value is undefined or unknown or in

```
        case of a TDMA or ATDMA channel."
REFERENCE
    "Data-Over-Cable Service Interface Specifications: Radio
    Frequency Interface Specification SP-RFIV2.0-I10-051209,
    Section 6.2.11.2.1."
 ::= { docsIfUpstreamChannelEntry 12 }

docsIfUpChannelScdmaFrameSize OBJECT-TYPE
    SYNTAX      Unsigned32 (0..32)
    UNITS       "spreadIntervals"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "Applicable for SCDMA channel types only.
        SCDMA Frame size in units of spreading intervals.
        This value returns zero for non-SCDMA Profiles."
    REFERENCE
        "Data-Over-Cable Service Interface Specifications: Radio
        Frequency Interface Specification SP-RFIV2.0-I10-051209,
        Section 6.2.12."
    ::= { docsIfUpstreamChannelEntry 13 }

docsIfUpChannelScdmaHoppingSeed OBJECT-TYPE
    SYNTAX      Unsigned32 (0..32767)
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "Applicable for SCDMA channel types only.
        15-bit seed used for code hopping sequence initialization.
        Returns zero for non-SCDMA channel types.
        Setting this value to a value different than zero for
        non-SCDMA channel types returns the error 'wrongValue'."
    REFERENCE
        "Data-Over-Cable Service Interface Specifications: Radio
        Frequency Interface Specification SP-RFIV2.0-I10-051209,
        Section 6.2.14.1."
    ::= { docsIfUpstreamChannelEntry 14 }

docsIfUpChannelType OBJECT-TYPE
    SYNTAX      DocsisUpstreamType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Reflects the Upstream channel type.
        This object returns the value of docsIfCmtsModChannelType
        for the modulation profile selected in
        docsIfUpChannelModulationProfile for this row."
    REFERENCE
```

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 6.2.1."

::= { docsIfUpstreamChannelEntry 15 }

docsIfUpChannelCloneFrom OBJECT-TYPE

SYNTAX InterfaceIndexOrZero

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object contains the ifIndex value of the physical
interface row entry whose parameters are to be adjusted.

Upon setting this object to the ifIndex value of a
physical interface, the following interface objects values
are copied to this entry:

docsIfUpChannelFrequency,
docsIfUpChannelWidth,
docsIfUpChannelModulationProfile,
docsIfUpChannelSlotSize,
docsIfUpChannelRangingBackoffStart,
docsIfUpChannelRangingBackoffEnd,
docsIfUpChannelTxBackoffStart,
docsIfUpChannelTxBackoffEnd,
docsIfUpChannelScdmaActiveCodes,
docsIfUpChannelScdmaCodesPerSlot,
docsIfUpChannelScdmaFrameSize,
docsIfUpChannelScdmaHoppingSeed,
docsIfUpChannelType, and
docsIfUpChannelPreEqEnable

Setting this object to the value of a non-existent or
a temporary upstream interface returns the error
'wrongValue'.

This object MUST contain a value of zero for physical
interfaces entries.

Setting this object in row entries that correspond to
physical interfaces returns the error 'wrongValue'."

::= { docsIfUpstreamChannelEntry 16 }

docsIfUpChannelUpdate OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Used to perform the copy of adjusted parameters from the
temporary interface entry to the physical interface
indicated by the docsIfUpChannelCloneFrom object. The
transfer is initiated through an SNMP SET to 'true' of

this object.

A SET to 'true' fails and returns error 'commitFailed' if docsIfUpChannelStatus value is 'notInService', which means that the interface parameters values are not compatible with each other or have not been validated yet. Reading this object always returns 'false'."

::= { docsIfUpstreamChannelEntry 17 }

docsIfUpChannelStatus OBJECT-TYPE

SYNTAX RowStatus

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object is only used for the creation of a temporary upstream row with the purpose of updating the parameters of a physical upstream channel entry.

The following restrictions apply to this object:

1. This object is not writable for physical interfaces.
2. Temporary interface entries are only created by a SET of this object to createAndWait(5).
3. ifAdminStatus from the Interface MIB RFC 2863 is used to take a physical upstream channel offline, to be consistent with DOCSIS 1.x operation, as indicated in RFC 2670.
In addition,
 - o ifAdminStatus 'down' is reflected in this object as 'notInService'.
 - o ifOperStatus 'down' while ifAdminStatus 'up' is reflected in this object as 'notInService'.
4. Temporary created rows MUST be set to 'active' with the purpose of validating upstream parameter consistency prior to transferring the parameters to the physical interface.

Below is a mandatory procedure for adjusting the values of a physical interface:

1. Create a temporary interface entry through an SNMP SET using 'createAndWait'. At this point, the RowStatus reports 'notReady'.
The Manager entity uses an ifIndex value outside the operational range of the physical interfaces for the creation of a temporary interface.
2. Set the docsIfUpChannelCloneFrom object to the ifIndex value of the physical row to update. Now docsIfUpChannelStatus reports 'notInService'.
3. Change the upstream parameters to the desired values in the temporary row.

```

4. Validate that all parameters are consistent by setting
   docsIfUpChannelStatus to 'active'. A failure to set the
   RowStatus to 'active' returns the error 'commitFailed',
   which means the parameters are not compatible with the
   target physical interface.
5. With docsIfUpChannelStatus 'active', transfer the
   parameters to the target physical interface by setting
   the object docsIfUpChannelUpdate to 'true'.
6. Delete the temporary row by setting
   docsIfUpChannelStatus to 'destroy'."
 ::= { docsIfUpstreamChannelEntry 18 }

```

```
docsIfUpChannelPreEqEnable OBJECT-TYPE
```

```
SYNTAX      TruthValue
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```

    "At the CMTS, this object is used to enable or disable
    pre-equalization on the upstream channel represented by
    this table instance. At the CM, this object is read-only
    and reflects the status of pre-equalization as represented
    in the RNG-RSP. Pre-equalization is considered enabled at
    the CM if a RNG-RSP with pre-equalization data has been
    received at least once since the last mac
    reinitialization."

```

```
DEFVAL {false}
```

```
::= { docsIfUpstreamChannelEntry 19 }
```

```

-- 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 docsIfCmServiceTable.
--

```

```
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 (for Cable Modem Termination System), or based on information extracted from the TFTP option file (for Cable Modem).
 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, -- deprecated
    docsIfQosProfBaselinePrivacy TruthValue,
    docsIfQosProfStatus          RowStatus,
    docsIfQosProfMaxTransmitBurst Integer32,
    docsIfQosProfStorageType     StorageType
}
```

docsIfQosProfIndex OBJECT-TYPE
 SYNTAX Integer32 (1..16383)

MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "The index value that 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."
REFERENCE
 "Data-Over-Cable Service Interface Specifications: Radio
 Frequency Interface Specification SP-RFIV2.0-I10-051209,
 Annex C.1.1.4."
DEFVAL { 0 }
::= { docsIfQosProfileEntry 2 }

docsIfQosProfMaxUpBandwidth OBJECT-TYPE

SYNTAX Integer32 (0..100000000)
UNITS "bits per second"
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."
REFERENCE
 "Data-Over-Cable Service Interface Specifications: Radio
 Frequency Interface Specification SP-RFIV2.0-I10-051209,
 Annex C.1.1.4."
DEFVAL { 0 }
::= { docsIfQosProfileEntry 3 }

docsIfQosProfGuarUpBandwidth OBJECT-TYPE

SYNTAX Integer32 (0..100000000)
UNITS "bits per second"
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."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Annex C.1.1.4."

DEFVAL { 0 }

::= { docsIfQosProfileEntry 4 }

docsIfQosProfMaxDownBandwidth OBJECT-TYPE

SYNTAX Integer32 (0..100000000)

UNITS "bits per second"

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."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Annex C.1.1.4."

DEFVAL { 0 }

::= { docsIfQosProfileEntry 5 }

docsIfQosProfMaxTxBurst OBJECT-TYPE

SYNTAX Integer32 (0..255)

UNITS "mini-slots"

MAX-ACCESS read-create

STATUS deprecated

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.
This object has been deprecated and replaced by
docsIfQosProfMaxTransmitBurst, to fix a mismatch
of the units and value range with respect to the DOCSIS
Maximum Upstream Channel Transmit Burst Configuration
Setting."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
C.1.1.4."

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 object is used to create or delete rows in this table. This object MUST NOT be changed from active while the row is referenced by any entry in either docsIfCmServiceTable (on the CM) or docsIfCmtsServiceTable (on the CMTS)."

::= { docsIfQosProfileEntry 8 }

docsIfQosProfMaxTransmitBurst OBJECT-TYPE

SYNTAX Integer32 (0..65535)

UNITS "bytes"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The maximum number of bytes that may be requested for a single upstream transmission. A value of zero means there is no limit. Note: This value does not include any physical layer overhead.

MUST NOT be changed while this row is active."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Annex C.1.1.4."

DEFVAL { 0 }

::= { docsIfQosProfileEntry 9 }

docsIfQosProfStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The storage type for this conceptual row.

Entries with this object set to permanent(4)

```

        do not require write operations for writable
        objects."
 ::= { docsIfQosProfileEntry 10 }

```

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, this object 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, this object describes the PHY characteristics of
    a downstream channel.  At the CMTS, it describes the PHY
    signal quality of an upstream channel.
    An entry in this table exists for each ifEntry with an
    ifType of docsCableDownstream(128) for Cable Modems.
    For DOCSIS 1.1 Cable Modem Termination Systems, an entry
    exists for each ifEntry with an ifType of
    docsCableUpstream (129).
    For DOCSIS 2.0 Cable Modem Termination Systems, an entry
    exists for each ifEntry with an ifType of
    docsCableUpstreamChannel (205)."
INDEX { ifIndex }
 ::= { docsIfSignalQualityTable 1 }

```

```

DocsIfSignalQualityEntry ::= SEQUENCE {
    docsIfSigQIncludesContention  TruthValue,
    docsIfSigQUnerrored          Counter32,
    docsIfSigQCorrected          Counter32,
    docsIfSigQUncorrectables     Counter32,
    docsIfSigQSignalNoise        TenthdB,
    docsIfSigQMicroreflections    Integer32,
    docsIfSigQEqualizationData    DocsEqualizerData,
    docsIfSigQExtUnerrored       Counter64,
    docsIfSigQExtCorrected       Counter64,
    docsIfSigQExtUncorrectables   Counter64
}

```

docsIfSigQIncludesContention OBJECT-TYPE

SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "true(1) if this CMTS includes contention intervals in
 the counters in this table. Always false(2) for CMs."
REFERENCE
 "Data-Over-Cable Service Interface Specifications: Radio
 Frequency Interface Specification SP-RFIV2.0-I10-051209,
 Section 9.4.1"
::= { docsIfSignalQualityEntry 1 }

docsIfSigQUnerrored OBJECT-TYPE

SYNTAX Counter32
UNITS "codewords"
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.
 Discontinuities in the value of this counter can occur
 at reinitialization of the managed system, and at other
 times as indicated by the value of
 ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
 "Data-Over-Cable Service Interface Specifications: Radio
 Frequency Interface Specification SP-RFIV2.0-I10-051209,
 Sections 6.2.4, and 6.3.6."
::= { docsIfSignalQualityEntry 2 }

docsIfSigQCorrected OBJECT-TYPE

SYNTAX Counter32
UNITS "codewords"
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.
 Discontinuities in the value of this counter can occur
 at reinitialization of the managed system, and at other
 times as indicated by the value of
 ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
 "Data-Over-Cable Service Interface Specifications: Radio
 Frequency Interface Specification SP-RFIV2.0-I10-051209,
 Sections 6.2.4, and 6.3.6."


```
 ::= { docsIfSignalQualityEntry 3 }

docsIfSigQUncorrectables OBJECT-TYPE
    SYNTAX      Counter32
    UNITS        "codewords"
    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.
        Discontinuities in the value of this counter can occur
        at reinitialization of the managed system, and at other
        times as indicated by the value of
        ifCounterDiscontinuityTime for the associated ifIndex."
    REFERENCE
        "Data-Over-Cable Service Interface Specifications: Radio
        Frequency Interface Specification SP-RFIV2.0-I10-051209,
        Sections 6.2.4, and 6.3.6."
    ::= { docsIfSignalQualityEntry 4 }

docsIfSigQSignalNoise OBJECT-TYPE
    SYNTAX      TenthdB
    UNITS        "TenthdB"
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "Signal/Noise ratio as perceived for this channel.
        At the CM, this object describes the Signal/Noise of the
        downstream channel. At the CMTS, it describes the
        average Signal/Noise of the upstream channel."
    REFERENCE
        "Data-Over-Cable Service Interface Specifications: Radio
        Frequency Interface Specification SP-RFIV2.0-I10-051209,
        Tables 4-1 and 4-2"
    ::= { docsIfSignalQualityEntry 5 }

docsIfSigQMicroreflections OBJECT-TYPE
    SYNTAX      Integer32 (0..255)
    UNITS        "-dBc"
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "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 it gives a rough indication
```

of microreflections received on this interface.
It is up to the implementer to provide information
as accurately as possible."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Tables 4-1 and 4-2"

::= { docsIfSignalQualityEntry 6 }

docsIfSigQEqualizationData OBJECT-TYPE

SYNTAX DocsEqualizerData

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"At the CM, this object returns the equalization data for
the downstream channel.

At the CMTS, this object is not applicable and is not
instantiated. Note that previous CMTS implementations
may instantiate this object in two ways:

- An equalization value indicating an equalization
average for the upstream channel. Those values have
vendor-dependent interpretations.
- Return a zero-length OCTET STRING to indicate that
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 }

docsIfSigQExtUnerroreds OBJECT-TYPE

SYNTAX Counter64

UNITS "codewords"

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.
This is the 64-bit version of docsIfSigQUnerroreds.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio

```
    Frequency Interface Specification SP-RFIV2.0-I10-051209,  
    Sections 6.2.4, and 6.3.6."  
 ::= { docsIfSignalQualityEntry 8 }
```

docsIfSigQExtCorrecteds OBJECT-TYPE

```
SYNTAX      Counter64  
UNITS       "codewords"  
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.  
    This is the 64-bit version of docsIfSigQCorrecteds.  
    Discontinuities in the value of this counter can occur  
    at reinitialization of the managed system, and at other  
    times as indicated by the value of  
    ifCounterDiscontinuityTime for the associated ifIndex."  
REFERENCE  
    "Data-Over-Cable Service Interface Specifications: Radio  
    Frequency Interface Specification SP-RFIV2.0-I10-051209,  
    Sections 6.2.4, and 6.3.6."  
 ::= { docsIfSignalQualityEntry 9 }
```

docsIfSigQExtUncorrectables OBJECT-TYPE

```
SYNTAX      Counter64  
UNITS       "codewords"  
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.  
    This is the 64-bit version of docsIfSigQUncorrectables.  
    Discontinuities in the value of this counter can occur  
    at reinitialization of the managed system, and at other  
    times as indicated by the value of  
    ifCounterDiscontinuityTime for the associated ifIndex."  
REFERENCE  
    "Data-Over-Cable Service Interface Specifications: Radio  
    Frequency Interface Specification SP-RFIV2.0-I10-051209,  
    Sections 6.2.4, 6.3.6."  
 ::= { docsIfSignalQualityEntry 10 }
```

--

-- DOCSIS Version of the device

--

docsIfDocsisBaseCapability OBJECT-TYPE

SYNTAX DocsisVersion

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indication of the DOCSIS capability of the device."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Annex G."

::= { docsIfBaseObjects 5 }

--

-- 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."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 8.2.2."

::= { 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. Note that BITS objects are encoded most significant bit first. For example, if bit 1 is set, the value of this object is the octet string '40'H."

::= { docsIfCmMacEntry 2 }

docsIfCmRangingRespTimeout OBJECT-TYPE

SYNTAX TimeTicks
MAX-ACCESS read-write
STATUS obsolete

DESCRIPTION

"Waiting time for a Ranging Response packet. This object has been obsoleted and replaced by docsIfCmRangingTimeout to correct the typing to TimeInterval."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 9.1.6."

DEFVAL { 20 }

::= { docsIfCmMacEntry 3 }

docsIfCmRangingTimeout OBJECT-TYPE

SYNTAX TimeInterval

UNITS "HundredOfSeconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Waiting time for a Ranging Response packet.
This object MUST NOT persist at reinitialization
of the managed system."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 9.1.6, 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 Cable Modem.
An entry in this table exists for each ifEntry with an
ifType of docsCableMacLayer(127)."

INDEX { ifIndex }

::= { docsIfCmStatusTable 1 }

DocsIfCmStatusEntry ::= SEQUENCE {

docsIfCmStatusValue

INTEGER,

docsIfCmStatusCode

OCTET STRING,

docsIfCmStatusTxPower

TenthdBmV,

docsIfCmStatusResets

Counter32,

docsIfCmStatusLostSyncs

Counter32,

```

docsIfCmStatusInvalidMaps          Counter32,
docsIfCmStatusInvalidUcds          Counter32,
docsIfCmStatusInvalidRangingResponses Counter32,
docsIfCmStatusInvalidRegistrationResponses Counter32,
docsIfCmStatusT1Timeouts           Counter32,
docsIfCmStatusT2Timeouts           Counter32,
docsIfCmStatusT3Timeouts           Counter32,
docsIfCmStatusT4Timeouts           Counter32,
docsIfCmStatusRangingAbortedCs     Counter32,
docsIfCmStatusDocsisOperMode       DocsisQosVersion,
docsIfCmStatusModulationType        DocsisUpstreamType,
docsIfCmStatusEqualizationData      DocsEqualizerData,
docsIfCmStatusUCCs                  Counter32,
docsIfCmStatusUCCFails              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. Interpretations for state values 1-12 are clearly outlined in the SP-RFI reference given below.

The state value accessDenied(13) indicates the CMTS has sent a Registration Aborted message to the CM. The same state is reported as accessDenied(7) by the CMTS object docsIfCmtsCmStatusValue."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 11.2.

Data-Over-Cable Service Interface Specifications:

Operations Support System Interface Specification
SP-OSSIV2.0-I09-050812, Section 6.3.4.2."
 ::= { docsIfCmStatusEntry 1 }

docsIfCmStatusCode OBJECT-TYPE

SYNTAX OCTET STRING (SIZE(0 | 5 | 6))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Status code for a Cable Modem as defined in the
OSSI Specification. The status code consists
of a single character indicating error groups, followed
by a two- or three-digit number indicating the status
condition, followed by a decimal.
An example of a returned value could be 'T101.0'.
The zero-length OCTET STRING indicates no status code yet
registered."
REFERENCE
"Data-Over-Cable Service Interface Specifications:
Operations Support System Interface Specification
SP-OSSIV2.0-I09-050812, Annex D."
 ::= { docsIfCmStatusEntry 2 }

docsIfCmStatusTxPower OBJECT-TYPE

SYNTAX TenthdBmV
UNITS "TenthdBmV"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The operational transmit power for the attached upstream
channel."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 6.2.18."
 ::= { docsIfCmStatusEntry 3 }

docsIfCmStatusResets OBJECT-TYPE

SYNTAX Counter32
UNITS "resets"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of times the CM reset or initialized this
interface.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other

times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmStatusEntry 4 }

docsIfCmStatusLostSynchs OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of times the CM lost synchronization with
the downstream channel.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 8.3.2."

::= { docsIfCmStatusEntry 5 }

docsIfCmStatusInvalidMaps OBJECT-TYPE

SYNTAX Counter32

UNITS "maps"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of times the CM received invalid MAP messages.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 8.3.4."

::= { docsIfCmStatusEntry 6 }

docsIfCmStatusInvalidUcds OBJECT-TYPE

SYNTAX Counter32

UNITS "messages"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of times the CM received invalid UCD messages.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of

ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 8.3.3."
::= { docsIfCmStatusEntry 7 }

docsIfCmStatusInvalidRangingResponses OBJECT-TYPE

SYNTAX Counter32
UNITS "messages"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of times the CM received invalid ranging response
messages.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 8.3.6."
::= { docsIfCmStatusEntry 8 }

docsIfCmStatusInvalidRegistrationResponses OBJECT-TYPE

SYNTAX Counter32
UNITS "messages"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of times the CM received invalid registration
response messages.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 8.3.8."
::= { docsIfCmStatusEntry 9 }

docsIfCmStatusTlTimeouts OBJECT-TYPE

SYNTAX Counter32
UNITS "timeouts"
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Number of times counter T1 expired in the CM.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Figure 9-2."

::= { docsIfCmStatusEntry 10 }

docsIfCmStatusT2Timeouts OBJECT-TYPE

SYNTAX Counter32

UNITS "timeouts"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of times counter T2 expired in the CM.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Figure 9-2."

::= { docsIfCmStatusEntry 11 }

docsIfCmStatusT3Timeouts OBJECT-TYPE

SYNTAX Counter32

UNITS "timeouts"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of times counter T3 expired in the CM.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Figure 9-2."

::= { docsIfCmStatusEntry 12 }

docsIfCmStatusT4Timeouts OBJECT-TYPE

SYNTAX Counter32

UNITS "timeouts"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of times counter T4 expired in the CM.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Figure 9-2."
::= { docsIfCmStatusEntry 13 }

docsIfCmStatusRangingAborted OBJECT-TYPE

SYNTAX Counter32
UNITS "attempts"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Number of times the ranging process was aborted
by the CMTS.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 9.3.3."
::= { docsIfCmStatusEntry 14 }

docsIfCmStatusDocsisOperMode OBJECT-TYPE

SYNTAX DocsisQosVersion
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Indication of whether the device has registered using 1.0
Class of Service or 1.1 Quality of Service.
An unregistered CM SHOULD indicate 'docsis11' for a
docsIfDocsisBaseCapability value of DOCSIS 1.1/2.0. An
unregistered CM SHOULD indicate 'docsis10' for a
docsIfDocsisBaseCapability value of DOCSIS 1.0."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Annex G."

```
::= { docsIfCmStatusEntry 15 }
```

```
docsIfCmStatusModulationType OBJECT-TYPE
```

```
SYNTAX      DocsisUpstreamType
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"Indicates modulation type status currently used by the
CM.  Since this object specifically identifies PHY mode,
the shared upstream channel type is not permitted."
```

```
REFERENCE
```

```
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 6.2.1."
```

```
::= { docsIfCmStatusEntry 16 }
```

```
docsIfCmStatusEqualizationData OBJECT-TYPE
```

```
SYNTAX      DocsEqualizerData
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"Pre-equalization data for this CM after convolution with
data indicated in the RNG-RSP.  This data is valid when
docsIfUpChannelPreEqEnable is set to true."
```

```
REFERENCE
```

```
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Figure 8-23."
```

```
::= { docsIfCmStatusEntry 17 }
```

```
docsIfCmStatusUCCs OBJECT-TYPE
```

```
SYNTAX      Counter32
```

```
UNITS       "attempts"
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"The number of successful Upstream Channel Change
transactions.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."
```

```
::= { docsIfCmStatusEntry 18 }
```

```
docsIfCmStatusUCCFails OBJECT-TYPE
```

```
SYNTAX      Counter32
```

```
UNITS       "attempts"
```

```

MAX-ACCESS      read-only
STATUS          current
DESCRIPTION
    "The number of failed Upstream Channel Change
    transactions.
    Discontinuities in the value of this counter can occur
    at reinitialization of the managed system, and at other
    times as indicated by the value of
    ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmStatusEntry 19 }

```

```

--
-- 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,
    docsIfCmServiceTxExceededs Counter32,
    docsIfCmServiceRqRetries   Counter32,
    docsIfCmServiceRqExceededs Counter32,
    docsIfCmServiceExtTxSlotsImmed Counter64,
    docsIfCmServiceExtTxSlotsDed Counter64
}

```

```
}
```

```
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
```

```
    UNITS       "mini-slots"
```

```
    MAX-ACCESS  read-only
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "The number of upstream mini-slots that have been used to
        transmit data PDUs in immediate (contention) mode.  This
        includes only those PDUs that are presumed to have
        arrived at the head-end (i.e., those that were explicitly
        acknowledged).  It does not include retransmission attempts
        or mini-slots used by requests.
```

```
        Discontinuities in the value of this counter can occur
        at reinitialization of the managed system, and at other
        times as indicated by the value of
```

```
        ifCounterDiscontinuityTime for the associated ifIndex."
```

```
    REFERENCE
```

```
        "Data-Over-Cable Service Interface Specifications: Radio
        Frequency Interface Specification SP-RFIV2.0-I10-051209,
        Section 9.4."
```

```
    ::= { docsIfCmServiceEntry 3 }
```

```
docsIfCmServiceTxSlotsDed OBJECT-TYPE
```

SYNTAX Counter32
UNITS "mini-slots"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The number of upstream mini-slots that have been used to transmit data PDUs in dedicated mode (i.e., as a result of a unicast Data Grant). Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
 "Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 9.4."
::= { docsIfCmServiceEntry 4 }

docsIfCmServiceTxRetries OBJECT-TYPE

SYNTAX Counter32
UNITS "attempts"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The number of attempts to transmit data PDUs containing requests for acknowledgment that did not result in acknowledgment. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
 "Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 9.4."
::= { docsIfCmServiceEntry 5 }

docsIfCmServiceTxExceededs OBJECT-TYPE

SYNTAX Counter32
UNITS "attempts"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The number of data PDU transmission failures due to excessive retries without acknowledgment. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 9.4."
::= { docsIfCmServiceEntry 6 }

docsIfCmServiceRqRetries OBJECT-TYPE

SYNTAX Counter32
UNITS "attempts"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of attempts to transmit bandwidth requests
that did not result in acknowledgment.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 9.4."
::= { docsIfCmServiceEntry 7 }

docsIfCmServiceRqExceededs OBJECT-TYPE

SYNTAX Counter32
UNITS "attempts"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The number of requests for bandwidth that failed due to
excessive retries without acknowledgment.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 9.4."
::= { docsIfCmServiceEntry 8 }

docsIfCmServiceExtTxSlotsImmed OBJECT-TYPE

SYNTAX Counter64
UNITS "mini-slots"
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The number of upstream mini-slots that have been used to transmit data PDUs in immediate (contention) mode. This includes only those PDUs that are presumed to have arrived at the head-end (i.e., those that were explicitly acknowledged). It does not include retransmission attempts or mini-slots used by requests. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 9.4."

::= { docsIfCmServiceEntry 9 }

docsIfCmServiceExtTxSlotsDed OBJECT-TYPE

SYNTAX Counter64
 UNITS "mini-slots"
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION

"The number of upstream mini-slots that have been used to transmit data PDUs in dedicated mode (i.e., as a result of a unicast Data Grant). Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 9.4."

::= { docsIfCmServiceEntry 10 }

--

-- 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,
docsIfCmtsMacStorageType	StorageType

}

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.
Note that BITS objects are encoded most significant bit
first. For example, if bit 1 is set, the value of this
object is the octet string '40'H."

::= { 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
    "Data-Over-Cable Service Interface Specifications: Radio
    Frequency Interface Specification SP-RFIV2.0-I10-051209,
    Section 9.3."
::= { 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
    "Data-Over-Cable Service Interface Specifications: Radio
    Frequency Interface Specification SP-RFIV2.0-I10-051209,
    Section 9.3"
::= { docsIfCmtsMacEntry 3 }
```

docsIfCmtsMaxServiceIds OBJECT-TYPE

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

docsIfCmtsInsertionInterval OBJECT-TYPE

```
SYNTAX      TimeTicks
MAX-ACCESS  read-write
STATUS      obsolete
DESCRIPTION
    "The amount of time to elapse between each broadcast
    initial maintenance grant. Broadcast initial 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. The maximum amount of
```

time permitted by the specification is 2 seconds.
This object has been obsoleted and replaced by
docsIfCmtsInsertInterval to fix a SYNTAX typing problem."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Annex B."

::= { docsIfCmtsMacEntry 5 }

docsIfCmtsInvitedRangingAttempts OBJECT-TYPE

SYNTAX Integer32 (0..1024)

UNITS "attempts"

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

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 9.3.3 and Annex B."

::= { docsIfCmtsMacEntry 6 }

docsIfCmtsInsertInterval OBJECT-TYPE

SYNTAX TimeInterval

UNITS "HundredOfSeconds"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The amount of time to elapse between each broadcast
initial maintenance grant. Broadcast initial 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. The maximum amount of
time permitted by the specification is 2 seconds."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Annex B."

::= { docsIfCmtsMacEntry 7 }

docsIfCmtsMacStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The storage type for this conceptual row."

```

        Entries with this object set to permanent(4)
        do not require write operations for read-write
        objects."
 ::= { docsIfCmtsMacEntry 8 }

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

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

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

INDEX { ifIndex }	
::= { docsIfCmtsStatusTable 1 }	

```

DocsIfCmtsStatusEntry ::= SEQUENCE {
    docsIfCmtsStatusInvalidRangeReqs      Counter32,
    docsIfCmtsStatusRangingAbortedReqs    Counter32,
    docsIfCmtsStatusInvalidRegReqs        Counter32,
    docsIfCmtsStatusFailedRegReqs         Counter32,
    docsIfCmtsStatusInvalidDataReqs       Counter32,
    docsIfCmtsStatusT5Timeouts            Counter32
}

docsIfCmtsStatusInvalidRangeReqs OBJECT-TYPE
    SYNTAX      Counter32
    UNITS       "messages"
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "This object counts invalid RNG-REQ messages received on
        this interface.
        Discontinuities in the value of this counter can occur
```

at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 8.3.5."

::= { docsIfCmtsStatusEntry 1 }

docsIfCmtsStatusRangingAborted OBJECT-TYPE

SYNTAX Counter32
UNITS "attempts"
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"This object counts ranging attempts that were explicitly aborted by the CMTS. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 8.3.6."

::= { docsIfCmtsStatusEntry 2 }

docsIfCmtsStatusInvalidRegReqs OBJECT-TYPE

SYNTAX Counter32
UNITS "messages"
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"This object counts invalid REG-REQ messages received on this interface; that is, syntax, out of range parameters, or erroneous requests. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 8.3.7."

::= { docsIfCmtsStatusEntry 3 }

docsIfCmtsStatusFailedRegReqs OBJECT-TYPE

SYNTAX Counter32

UNITS "attempts"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object counts failed registration attempts. Included are docsIfCmtsStatusInvalidRegReqs, authentication, and class of service failures. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 8.3.7."
::= { docsIfCmtsStatusEntry 4 }

docsIfCmtsStatusInvalidDataReqs OBJECT-TYPE
SYNTAX Counter32
UNITS "messages"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object counts invalid data request messages received on this interface. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
::= { docsIfCmtsStatusEntry 5 }

docsIfCmtsStatusT5Timeouts OBJECT-TYPE
SYNTAX Counter32
UNITS "timeouts"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object counts the number of times counter T5 expired on this interface. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Figure 9-2."
::= { 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, -- deprecated
    docsIfCmtsCmStatusDownChannelIfIndex  InterfaceIndexOrZero,
    docsIfCmtsCmStatusUpChannelIfIndex  InterfaceIndexOrZero,
    docsIfCmtsCmStatusRxPower        TenthdBmV,
    docsIfCmtsCmStatusTimingOffset   Unsigned32,
    docsIfCmtsCmStatusEqualizationData DocsEqualizerData,
    docsIfCmtsCmStatusValue          INTEGER,
    docsIfCmtsCmStatusUnerroreds     Counter32,
    docsIfCmtsCmStatusCorrecteds     Counter32,
    docsIfCmtsCmStatusUncorrectables Counter32,
    docsIfCmtsCmStatusSignalNoise    TenthdB,
    docsIfCmtsCmStatusMicroreflections Integer32,
    docsIfCmtsCmStatusExtUnerroreds   Counter64,
    docsIfCmtsCmStatusExtCorrecteds   Counter64,
    docsIfCmtsCmStatusExtUncorrectables Counter64,
    docsIfCmtsCmStatusDocsisRegMode   DocsisQosVersion,
    docsIfCmtsCmStatusModulationType  DocsisUpstreamType,
    docsIfCmtsCmStatusInetAddressType InetAddressType,
    docsIfCmtsCmStatusInetAddress    InetAddress,

```

```
docsIfCmtsCmStatusValueLastUpdate      TimeStamp,
docsIfCmtsCmStatusHighResolutionTimingOffset Unsigned32
}
```

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 the cable modem. If the cable modem has

multiple MAC addresses, this is the MAC address associated

with the Cable interface."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Section 8.2.2."

::= { docsIfCmtsCmStatusEntry 2 }

docsIfCmtsCmStatusIpAddress OBJECT-TYPE

SYNTAX IpAddress

MAX-ACCESS read-only

STATUS deprecated

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.

This object has been deprecated and replaced by

docsIfCmtsCmStatusInetAddressType and

docsIfCmtsCmStatusInetAddress, to enable IPv6 addressing
in the future."

::= { docsIfCmtsCmStatusEntry 3 }

docsIfCmtsCmStatusDownChannelIfIndex OBJECT-TYPE

SYNTAX InterfaceIndexOrZero

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"IfIndex of the downstream channel that 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

"For DOCSIS 2.0, indicates the ifIndex of the logical upstream channel (ifType 205) this CM is connected to.

For DOCSIS 1.x, indicates the ifIndex of the upstream channel (ifType 129) 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 "TenthdBmV"

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

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 6.2.18."

::= { docsIfCmtsCmStatusEntry 6 }

docsIfCmtsCmStatusTimingOffset OBJECT-TYPE

SYNTAX Unsigned32 (0..4294967295)

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.

For channels requiring finer resolution, please refer to object docsIfCmtsCmStatusHighResolutionTimingOffset."

REFERENCE

```
    "Data-Over-Cable Service Interface Specifications: Radio
    Frequency Interface Specification SP-RFIV2.0-I10-051209,
    Section 6.2.17."
 ::= { docsIfCmtsCmStatusEntry 7 }
```

docsIfCmtsCmStatusEqualizationData OBJECT-TYPE

SYNTAX DocEqualizerData

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Equalization data for this CM, as measured by the CMTS.
Returns the zero-length OCTET STRING if the value is
unknown or if there is no equalization data available
or defined."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Figure 8-23."

```
 ::= { docsIfCmtsCmStatusEntry 8 }
```

docsIfCmtsCmStatusValue OBJECT-TYPE

SYNTAX INTEGER {

other(1),

ranging(2),

rangingAborted(3),

rangingComplete(4),

ipComplete(5),

registrationComplete(6),

accessDenied(7),

operational(8),

-- value 8 should not be used

registeredBPInitializing(9)

}

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.

operational(8)

Value 8 is considered reserved and should not be defined in future revisions of this MIB module to avoid conflict with documented implementations that support value 8 to indicate operational state after completing the BPI initialization process.

registeredBPIInitializing(9)

Baseline Privacy (BPI) is enabled and the CMTS is in the process of completing BPI initialization. This state MAY last for a significant length of time if failures occur during the initialization process. After completion of BPI initialization, the CMTS will report registrationComplete(6).

The CMTS only needs to report states it is able to detect."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 11.2."

```
::= { docsIfCmtsCmStatusEntry 9 }
```

docsIfCmtsCmStatusUnerrored OBJECT-TYPE

```
SYNTAX      Counter32
UNITS       "codewords"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
```

"Codewords received without error from this cable modem. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 6.2.4."

```
::= { docsIfCmtsCmStatusEntry 10 }
```

docsIfCmtsCmStatusCorrecteds OBJECT-TYPE

SYNTAX Counter32
UNITS "codewords"
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Codewords received with correctable errors from this cable modem.
Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 6.2.4."

::= { docsIfCmtsCmStatusEntry 11 }

docsIfCmtsCmStatusUncorrectables OBJECT-TYPE

SYNTAX Counter32
UNITS "codewords"
MAX-ACCESS read-only
STATUS current
DESCRIPTION

"Codewords received with uncorrectable errors from this cable modem.
Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 6.2.4."

::= { docsIfCmtsCmStatusEntry 12 }

docsIfCmtsCmStatusSignalNoise OBJECT-TYPE

SYNTAX TenthdB
UNITS "TenthdB"
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."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio

Frequency Interface Specification SP-RFIV2.0-I10-051209,
Tables 4-1 and 4-2."
 ::= { 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 it gives a rough indication of microreflections received on this interface.

It is up to the implementer to provide information as accurately as possible.

Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Tables 4-1 and 4-2"

::= { docsIfCmtsCmStatusEntry 14 }

docsIfCmtsCmStatusExtUnerroreds OBJECT-TYPE

SYNTAX Counter64

UNITS "codewords"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Codewords received without error from this cable modem.

Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

ifCounterDiscontinuityTime for the associated ifIndex."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Section 6.2.5."

::= { docsIfCmtsCmStatusEntry 15 }

docsIfCmtsCmStatusExtCorrecteds OBJECT-TYPE

SYNTAX Counter64

UNITS "codewords"

MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "Codewords received with correctable errors from this
 cable modem.
 Discontinuities in the value of this counter can occur
 at reinitialization of the managed system, and at other
 times as indicated by the value of
 ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
 "Data-Over-Cable Service Interface Specifications: Radio
 Frequency Interface Specification SP-RFIV2.0-I10-051209,
 Section 6.2.5."
::= { docsIfCmtsCmStatusEntry 16 }

docsIfCmtsCmStatusExtUncorrectables OBJECT-TYPE

SYNTAX Counter64
UNITS "codewords"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "Codewords received with uncorrectable errors from this
 cable modem.
 Discontinuities in the value of this counter can occur
 at reinitialization of the managed system, and at other
 times as indicated by the value of
 ifCounterDiscontinuityTime for the associated ifIndex."
REFERENCE
 "Data-Over-Cable Service Interface Specifications: Radio
 Frequency Interface Specification SP-RFIV2.0-I10-051209,
 Section 6.2.5."
::= { docsIfCmtsCmStatusEntry 17 }

docsIfCmtsCmStatusDocsisRegMode OBJECT-TYPE

SYNTAX DocsisQosVersion
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "Indication of whether the CM has registered using 1.0
 Class of Service or 1.1 Quality of Service."
REFERENCE
 "Data-Over-Cable Service Interface Specifications: Radio
 Frequency Interface Specification SP-RFIV2.0-I10-051209,
 Annex G."
::= { docsIfCmtsCmStatusEntry 18 }

docsIfCmtsCmStatusModulationType OBJECT-TYPE

SYNTAX DocsisUpstreamType

MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "Indicates modulation type currently used by the CM. Since this object specifically identifies PHY mode, the shared type is not permitted. If the upstream channel is unknown, this object returns a value of zero."

REFERENCE

 "Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFiv2.0-I10-051209, Table 8-19."

::= { docsIfCmtsCmStatusEntry 19 }

docsIfCmtsCmStatusInetAddressType OBJECT-TYPE

SYNTAX InetAddressType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The type of internet address of docsIfCmtsCmStatusInetAddress. If the cable modem internet address is unassigned or unknown, then the value of this object is unknown(0)."
 ::= { docsIfCmtsCmStatusEntry 20 }

docsIfCmtsCmStatusInetAddress OBJECT-TYPE

SYNTAX InetAddress
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "Internet address of this cable modem. If the Cable Modem has no Internet address assigned, or the Internet address is unknown, the value of this object is the zero-length OCTET STRING. If the cable modem has multiple Internet addresses, this object returns the Internet address associated with the Cable (i.e., RF MAC) interface."
 ::= { docsIfCmtsCmStatusEntry 21 }

docsIfCmtsCmStatusValueLastUpdate OBJECT-TYPE

SYNTAX TimeStamp
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The value of sysUpTime when docsIfCmtsCmStatusValue was last updated."
 ::= { docsIfCmtsCmStatusEntry 22 }

docsIfCmtsCmStatusHighResolutionTimingOffset OBJECT-TYPE

```

SYNTAX      Unsigned32 (0..4294967295)
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*256)). Returns zero if the value
    is unknown.
    This is the high resolution version of object
    docsIfCmtsCmStatusTimingOffset, for channels requiring
    finer resolution."
REFERENCE
    "Data-Over-Cable Service Interface Specifications: Radio
    Frequency Interface Specification SP-RFiv2.0-I10-051209,
    Section 6.2.17."
 ::= { docsIfCmtsCmStatusEntry 23 }

```

```

--
-- 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, -- deprecated
docsIfCmtsServiceAdminStatus INTEGER,
docsIfCmtsServiceQosProfile  Integer32,
docsIfCmtsServiceCreateTime  TimeStamp,
docsIfCmtsServiceInOctets    Counter32,
docsIfCmtsServiceInPackets   Counter32,
docsIfCmtsServiceNewCmStatusIndex Integer32
}

```

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      deprecated
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.

This object has been deprecated and replaced by docsIfCmtsServiceNewCmStatusIndex, to fix a mismatch of the value range with respect to docsIfCmtsCmStatusIndex (1..2147483647)."

```
 ::= { 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      TimeStamp
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"The value of sysUpTime when this entry was created."
```

```
::= { docsIfCmtsServiceEntry 5 }
```

```
docsIfCmtsServiceInOctets OBJECT-TYPE
```

```
SYNTAX      Counter32
```

```
UNITS       "Bytes"
```

```
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.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."
```

```
::= { docsIfCmtsServiceEntry 6 }
```

```
docsIfCmtsServiceInPackets OBJECT-TYPE
```

```
SYNTAX      Counter32
```

```
UNITS       "packets"
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"The cumulative number of Packet Data packets received
on this Service ID.
Discontinuities in the value of this counter can occur
at reinitialization of the managed system, and at other
times as indicated by the value of
ifCounterDiscontinuityTime for the associated ifIndex."
```

```
::= { docsIfCmtsServiceEntry 7 }
```

```
docsIfCmtsServiceNewCmStatusIndex OBJECT-TYPE
```

```
SYNTAX      Integer32 (0..2147483647)
```

```
MAX-ACCESS  read-only
```

```
STATUS      current
```

```
DESCRIPTION
```

```
"Pointer (via docsIfCmtsCmStatusIndex) 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 8 }
```

```
--
```

```
-- 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, which could report a value of
 'permanent' or 'readOnly' for docsIfCmtsModStorageType.
```

```
A CMTS MAY reject the creation of additional Interval
 Usage Codes for a modulation profile being defined at
 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 DEFVAL clauses but do have calculated defaults and need not be specified during row creation."

```
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,
    docsIfCmtsModByteInterleaverDepth  Unsigned32,
    docsIfCmtsModByteInterleaverBlockSize Unsigned32,
    docsIfCmtsModPreambleType          INTEGER,
    docsIfCmtsModTcmErrorCorrectionOn  TruthValue,
    docsIfCmtsModScdmaInterleaverStepSize Unsigned32,
    docsIfCmtsModScdmaSpreaderEnable   TruthValue,
    docsIfCmtsModScdmaSubframeCodes    Unsigned32,
    docsIfCmtsModChannelType           DocsisUpstreamType,
    docsIfCmtsModStorageType           StorageType
}
```

```
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),
        advPhyShortData(9),
        advPhyLongData(10),
        ugs(11)
    }
    MAX-ACCESS    not-accessible
    STATUS        current
    DESCRIPTION
        "An index into the Channel Modulation table that, when
        grouped with other Interval Usage Codes, fully
        instantiates all modulation sets for a given upstream
        channel."
    REFERENCE
        "Data-Over-Cable Service Interface Specifications: Radio
        Frequency Interface Specification SP-RFIV2.0-I10-051209,
        Table 8-20."
    ::= { docsIfCmtsModulationEntry 2 }

```

docsIfCmtsModControl OBJECT-TYPE

```

    SYNTAX        RowStatus
    MAX-ACCESS    read-create
    STATUS        current
    DESCRIPTION
        "Controls and reflects the status of rows in this table.
        There is no restriction on the changing of values in this
        table while their associated rows are active, with the
        exception of:

        1. If a modulation profile is being referenced by one
           or more upstream channels, an attempt to set the value
           of docsIfCmtsModChannelType returns an
           'inconsistentValue' error.

        2. If a modulation profile is being referenced by one
           or more upstream channels, an attempt to set
           docsIfCmtsModControl to destroy(6) or notInService(2)
           returns an 'inconsistentValue' error."
    ::= { docsIfCmtsModulationEntry 3 }

```

docsIfCmtsModType OBJECT-TYPE

```

    SYNTAX        INTEGER {
        other(1),
        qpsk(2),
        qam16(3),
        qam8(4),
        qam32(5),
        qam64(6),
        qam128(7)
    }

```

```
}
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "The modulation type used on this channel.  Returns
    other(1) if the modulation type is not
    qpsk, qam16, qam8, qam32, qam64, or qam128.
    Type qam128 is used for SCDMA channels only.
    See the reference for the modulation profiles
    implied by different modulation types."
REFERENCE
    "Data-Over-Cable Service Interface Specifications: Radio
    Frequency Interface Specification SP-RFIV2.0-I10-051209,
    Tables 6-7, and 8-19."
DEFVAL { qpsk }
 ::= { docsIfCmtsModulationEntry 4 }

docsIfCmtsModPreambleLen OBJECT-TYPE
    SYNTAX      Integer32 (0..1536)
    UNITS       "bits"
    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
        "Data-Over-Cable Service Interface Specifications: Radio
        Frequency Interface Specification SP-RFIV2.0-I10-051209,
        Tables 6-7, and 8-19."
    ::= { 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."
    REFERENCE
        "Data-Over-Cable Service Interface Specifications: Radio
        Frequency Interface Specification SP-RFIV2.0-I10-051209,
        Tables 6-7, and 8-19."
    DEFVAL { false }
    ::= { docsIfCmtsModulationEntry 6 }

docsIfCmtsModFECErrorCorrection OBJECT-TYPE
    SYNTAX      Integer32 (0..16)
```


UNITS "Bytes"
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
that no correction is employed. The number of check bytes
appended will be twice this value."
REFERENCE
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Tables 6-7, and 8-19."
DEFVAL { 0 }
 ::= { docsIfCmtsModulationEntry 7 }

docsIfCmtsModFECCodeWordLength OBJECT-TYPE
SYNTAX Integer32 (1..255)
UNITS "Bytes"
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
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Tables 6-7, and 8-19."
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
"Data-Over-Cable Service Interface Specifications: Radio
Frequency Interface Specification SP-RFIV2.0-I10-051209,
Table 8-19."
DEFVAL { 0 }
 ::= { docsIfCmtsModulationEntry 9 }

docsIfCmtsModMaxBurstSize OBJECT-TYPE
SYNTAX Integer32 (0..255)
UNITS "mini-slots"

```
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
    by this profile.
    Default value is 0, except for shortData, where it is 8."
REFERENCE
    "Data-Over-Cable Service Interface Specifications: Radio
    Frequency Interface Specification SP-RFIV2.0-I10-051209,
    Table 8-19."
::= { docsIfCmtsModulationEntry 10 }
```

docsIfCmtsModGuardTimeSize OBJECT-TYPE

```
SYNTAX        Unsigned32
UNITS         "Symbol-times"
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "The number of symbol-times that MUST follow the end of
    this channel's burst. Default value is the minimum time
    needed by the implementation for this modulation profile."
REFERENCE
    "Data-Over-Cable Service Interface Specifications: Radio
    Frequency Interface Specification SP-RFIV2.0-I10-051209,
    Tables 6-7, and 8-19."
::= { docsIfCmtsModulationEntry 11 }
```

docsIfCmtsModLastCodewordShortened OBJECT-TYPE

```
SYNTAX        TruthValue
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "Indicates whether the last FEC codeword is truncated."
REFERENCE
    "Data-Over-Cable Service Interface Specifications: Radio
    Frequency Interface Specification SP-RFIV2.0-I10-051209,
    Tables 6-7, and 8-19."
DEFVAL { true }
::= { docsIfCmtsModulationEntry 12 }
```

docsIfCmtsModScrambler OBJECT-TYPE

```
SYNTAX        TruthValue
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION
    "Indicates whether the scrambler is employed."
```

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Tables 6-7, and 8-19."

DEFVAL { false }

::= { docsIfCmtsModulationEntry 13 }

docsIfCmtsModByteInterleaverDepth OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"ATDMA Byte Interleaver Depth (Ir). This object returns 1 for non-ATDMA profiles."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Tables 6-7, and 8-19."

DEFVAL { 1 }

::= { docsIfCmtsModulationEntry 14 }

docsIfCmtsModByteInterleaverBlockSize OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"ATDMA Byte Interleaver Block size (Br). This object returns zero for non-ATDMA profiles "

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I10-051209, Tables 6-7, and 8-19."

DEFVAL { 18 }

::= { docsIfCmtsModulationEntry 15 }

docsIfCmtsModPreambleType OBJECT-TYPE

SYNTAX INTEGER {

unknown(0),

qpsk0(1),

qpsk1(2)

}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Preamble type for DOCSIS 2.0 bursts. The value 'unknown(0)' represents a row entry consisting only of DOCSIS 1.x bursts"

REFERENCE

```
"Data-Over-Cable Service Interface Specifications: Radio
  Frequency Interface Specification SP-RFIV2.0-I10-051209,
  Tables 6-7, and 8-19."
DEFVAL { qpsk0 }
::= { docsIfCmtsModulationEntry 16 }

docsIfCmtsModTcmErrorCorrectionOn OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "Trellis Code Modulation (TCM) On/Off.  This value returns
         false for non-S-CDMA profiles."
    REFERENCE
        "Data-Over-Cable Service Interface Specifications: Radio
         Frequency Interface Specification SP-RFIV2.0-I10-051209,
         Tables 6-7, and 8-19."
    DEFVAL { false }
    ::= { docsIfCmtsModulationEntry 17 }

docsIfCmtsModScdmaInterleaverStepSize OBJECT-TYPE
    SYNTAX      Unsigned32 (0 | 1..32)
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        " S-CDMA Interleaver step size.  This value returns zero
         for non-S-CDMA profiles."
    REFERENCE
        "Data-Over-Cable Service Interface Specifications: Radio
         Frequency Interface Specification SP-RFIV2.0-I10-051209,
         Tables 6-7, and 8-19."
    DEFVAL { 1 }
    ::= { docsIfCmtsModulationEntry 18 }

docsIfCmtsModScdmaSpreaderEnable OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        " S-CDMA spreader.  This value returns false for non-S-CDMA
         profiles.  Default value for IUC 3 and 4 is OFF; for
         all other IUCs it is ON."
    REFERENCE
        "Data-Over-Cable Service Interface Specifications: Radio
         Frequency Interface Specification SP-RFIV2.0-I10-051209,
         Tables 6-7, and 8-19."
    ::= { docsIfCmtsModulationEntry 19 }
```

docsIfCmtsModScdmaSubframeCodes OBJECT-TYPE

SYNTAX Unsigned32 (0 | 1..128)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

" S-CDMA sub-frame size. This value returns zero for non-S-CDMA profiles."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFiv2.0-I10-051209, Table 6-7, and 8-19."

DEFVAL { 1 }

::= { docsIfCmtsModulationEntry 20 }

docsIfCmtsModChannelType OBJECT-TYPE

SYNTAX DocsisUpstreamType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Describes the modulation channel type for this modulation entry.

All the active entries in a modulation profile (that is all active entries that share a common docsIfCmtsModIndex)

MUST have the same value of docsIfCmtsModChannelType."

REFERENCE

"Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFiv2.0-I10-051209, Table 8-19."

DEFVAL { tdma }

::= { docsIfCmtsModulationEntry 21 }

docsIfCmtsModStorageType OBJECT-TYPE

SYNTAX StorageType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The storage type for this conceptual row.

Entries with this object set to permanent(4)

do not require write operations for read-write objects."

DEFVAL { nonVolatile }

::= { docsIfCmtsModulationEntry 22 }

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 updateByManagement(1)
    MUST be set when writing to this object.
    Note that BITS objects are encoded most significant bit
    first.  For example, if bit 2 is set, the value of this
    object is the octet string '20'H."
 ::= { 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 that
         represents that CM."
```

::= { docsIfCmtsMacToCmEntry 2 }

-- The following independent object and associated table provide
-- operators with a mechanism to evaluate the load/utilization of
-- both upstream and downstream physical channels. This information
-- may be used for capacity planning and incident analysis and may
-- be particularly helpful in provisioning of high value QoS.
--

-- Utilization is expressed as an index representing the calculated
-- percentage utilization of the upstream or downstream channel in
-- the most recent sampling interval (i.e., utilization interval).
-- Refer to the DESCRIPTION field of the
-- docsIfCmtsChannelUtUtilization object for definitions and
-- calculation details.

```

docsIfCmtsChannelUtilizationInterval OBJECT-TYPE
    SYNTAX      Integer32 (0..86400)
    UNITS       "seconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The time interval in seconds over which the channel
         utilization index is calculated.  All upstream/downstream
         channels use the same
         docsIfCmtsChannelUtilizationInterval."
```

Setting a value of zero disables utilization reporting. A channel utilization index is calculated over a fixed window applying to the most recent docsIfCmtsChannelUtilizationInterval. It would therefore be prudent to use a relatively short docsIfCmtsChannelUtilizationInterval. It is a vendor decision whether to reset the timer when docsIfCmtsChannelUtilizationInterval is changed during a utilization sampling period."

```
::= { docsIfCmtsObjects 8 }
```

docsIfCmtsChannelUtilizationTable OBJECT-TYPE

```
SYNTAX      SEQUENCE OF DocsIfCmtsChannelUtilizationEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "Reports utilization statistics for attached upstream and
    downstream physical channels."
::= { docsIfCmtsObjects 9 }
```

docsIfCmtsChannelUtilizationEntry OBJECT-TYPE

```
SYNTAX      DocsIfCmtsChannelUtilizationEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "Utilization statistics for a single upstream or downstream
    physical channel. An entry exists in this table for each
    ifEntry with an ifType equal to
    docsCableDownstream (128)
    or docsCableUpstream (129)."
```

```
INDEX { ifIndex, docsIfCmtsChannelUtIfType,
        docsIfCmtsChannelUtId }
::= { docsIfCmtsChannelUtilizationTable 1 }
```

```
DocsIfCmtsChannelUtilizationEntry ::= SEQUENCE {
    docsIfCmtsChannelUtIfType      IANAifType,
    docsIfCmtsChannelUtId          Integer32,
    docsIfCmtsChannelUtUtilization Integer32
}
```

docsIfCmtsChannelUtIfType OBJECT-TYPE

```
SYNTAX      IANAifType
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The secondary index into this table. Indicates the IANA
    interface type associated with this physical channel.
    Only docsCableDownstream (128) and
```



```
docsCableUpstream (129) are valid."
 ::= { docsIfCmtsChannelUtilizationEntry 1 }
```

docsIfCmtsChannelUtId OBJECT-TYPE

SYNTAX Integer32 (0..255)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The tertiary index into this table. Indicates the CMTS identifier for this physical channel."

```
 ::= { docsIfCmtsChannelUtilizationEntry 2 }
```

docsIfCmtsChannelUtUtilization OBJECT-TYPE

SYNTAX Integer32 (0..100)

UNITS "percent"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The calculated and truncated utilization index for this physical upstream or downstream channel, accurate as of the most recent docsIfCmtsChannelUtilizationInterval."

Upstream Channel Utilization Index:

The upstream channel utilization index is expressed as a percentage of mini-slots utilized on the physical channel, regardless of burst type. For an Initial Maintenance region, the mini-slots for the complete region are considered utilized if the CMTS received an upstream burst within the region from any CM on the physical channel. For contention REQ and REQ/DATA regions, the mini-slots for a transmission opportunity within the region are considered utilized if the CMTS received an upstream burst within the opportunity from any CM on the physical channel. For all other regions, utilized mini-slots are those in which the CMTS granted bandwidth to any unicast SID on the physical channel.

For an upstream interface that has multiple logical upstream channels enabled, the utilization index is a weighted sum of utilization indices for the logical channels. The weight for each utilization index is the percentage of upstream mini-slots allocated for the corresponding logical channel.

Example:

If 75% of bandwidth is allocated to the first logical channel and 25% to the second, and the utilization indices for each are 60 and 40, respectively, the

utilization index for the upstream physical channel is
 $(60 * 0.75) + (40 * 0.25) = 55$. This figure
 applies to the most recent utilization interval.

Downstream Channel Utilization Index:

The downstream channel utilization index is a percentage expressing the ratio between bytes used to transmit data versus the total number of bytes transmitted in the raw bandwidth of the MPEG channel. As with the upstream utilization index, the calculated value represents the most recent utilization interval.

Formula:

Downstream utilization index =
 $(100 * (\text{data bytes} / \text{raw bytes}))$

Definitions:

Data bytes: Number of bytes transmitted as data in the docsIfCmtsChannelUtilizationInterval. Identical to docsIfCmtsDownChannelCtrUsed Bytes measured over the utilization interval.

Raw bandwidth: Total number of bytes available for transmitting data, not including bytes used for headers and other overhead.

Raw bytes: $(\text{raw bandwidth} * \text{docsIfCmtsChannelUtilizationInterval})$. Identical to docsIfCmtsDownChannelCtrTotal Bytes measured over the utilization interval."

::= { docsIfCmtsChannelUtilizationEntry 3 }

-- The following table provides operators with input data
 -- appropriate for calculating downstream channel utilization.
 -- Operators may use the docsIfCmtsChannelUtilizationTable or
 -- perform their own polling of the
 -- docsIfCmtsDownChannelCounterTable objects to characterize
 -- their downstream channel usage. The 32-bit counter objects are
 -- included to provide backward compatibility with SNMPv1 managers,
 -- which cannot access 64-bit counter objects.

docsIfCmtsDownChannelCounterTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsIfCmtsDownChannelCounterEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table is implemented at the CMTS to collect
 downstream channel statistics for utilization

```

        calculations."
 ::= { docsIfCmtsObjects 10 }

```

docsIfCmtsDownChannelCounterEntry OBJECT-TYPE

SYNTAX DocsIfCmtsDownChannelCounterEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry provides a list of traffic counters for a single downstream channel.

An entry in this table exists for each ifEntry with an ifType of docsCableDownstream(128)."

INDEX { ifIndex }

```
 ::= { docsIfCmtsDownChannelCounterTable 1 }

```

DocsIfCmtsDownChannelCounterEntry ::= SEQUENCE {

docsIfCmtsDownChnlCtrId Integer32,

docsIfCmtsDownChnlCtrTotalBytes Counter32,

docsIfCmtsDownChnlCtrUsedBytes Counter32,

docsIfCmtsDownChnlCtrExtTotalBytes Counter64,

docsIfCmtsDownChnlCtrExtUsedBytes Counter64

```
 }

```

docsIfCmtsDownChnlCtrId OBJECT-TYPE

SYNTAX Integer32 (0..255)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The Cable Modem Termination System 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."

```
 ::= { docsIfCmtsDownChannelCounterEntry 1 }

```

docsIfCmtsDownChnlCtrTotalBytes OBJECT-TYPE

SYNTAX Counter32

UNITS "Bytes"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"At the CMTS, the total number of bytes in the Payload portion of MPEG Packets (i.e., not including MPEG header or pointer_field) transported by this downstream channel. This is the 32-bit version of

docsIfCmtsDownChnlCtrExtTotalBytes, included to provide back compatibility with SNMPv1 managers.

Discontinuities in the value of this counter can occur

at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsDownChannelCounterEntry 2 }

docsIfCmtsDownChnlCtrUsedBytes OBJECT-TYPE

SYNTAX Counter32

UNITS "Bytes"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"At the CMTS, the total number of DOCSIS data bytes transported by this downstream channel.

The number of data bytes is defined as the total number of bytes transported in DOCSIS payloads minus the number of stuff bytes transported in DOCSIS payloads.

This is the 32-bit version of docsIfCmtsDownChnlCtrExtUsedBytes, included to provide back compatibility with SNMPv1 managers.

Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

ifCounterDiscontinuityTime for the associated ifIndex."

::= { docsIfCmtsDownChannelCounterEntry 3 }

docsIfCmtsDownChnlCtrExtTotalBytes OBJECT-TYPE

SYNTAX Counter64

UNITS "Bytes"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"At the CMTS, the total number of bytes in the Payload portion of MPEG Packets (i.e., not including MPEG header or pointer_field) transported by this downstream channel.

This is the 64-bit version of docsIfCmtsDownChnlCtrTotalBytes and will not be accessible to SNMPv1 managers.

Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

ifCounterDiscontinuityTime for the associated ifIndex."

::= { docsIfCmtsDownChannelCounterEntry 4 }

docsIfCmtsDownChnlCtrExtUsedBytes OBJECT-TYPE

SYNTAX Counter64

UNITS "Bytes"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"At the CMTS, the total number of DOCSIS data bytes transported by this downstream channel. The number of data bytes is defined as the total number of bytes transported in DOCSIS payloads minus the number of stuff bytes transported in DOCSIS payloads. This is the 64-bit version of docsIfCmtsDownChnlCtrUsedBytes and will not be accessible to SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

::= { docsIfCmtsDownChannelCounterEntry 5 }

-- The following table provides operators with input data appropriate
-- for calculating upstream channel utilization, and for determining
-- the traffic characteristics of upstream channels. Operators may
-- use the docsIfCmtsChannelUtilizationTable or perform their own
-- polling of the docsIfCmtsUpChannelCounterTable objects for
-- utilization determination.
-- The first four 32 and 64 objects in this table are mandatory.
-- Vendors may choose to implement the remaining optional objects to
-- provide operators with finer characterization of upstream channel
-- traffic patterns. The 32-bit counter objects are included to
-- provide backward compatibility with SNMPv1 managers, which cannot
-- access 64-bit counter objects.

docsIfCmtsUpChannelCounterTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsIfCmtsUpChannelCounterEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"This table is implemented at the CMTS to provide upstream channel statistics appropriate for channel utilization calculations."

::= { docsIfCmtsObjects 11 }

docsIfCmtsUpChannelCounterEntry OBJECT-TYPE

SYNTAX DocsIfCmtsUpChannelCounterEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"List of traffic statistics for a single upstream channel. For DOCSIS 2.0 CMTSs, an entry in this table exists for each ifEntry with an ifType of docsCableUpstreamChannel (205)."

For DOCSIS 1.x CMTSS, an entry in this table exists for each ifEntry with an ifType of docsCableUpstream (129)."

INDEX { ifIndex }

::= { docsIfCmtsUpChannelCounterTable 1 }

```
DocsIfCmtsUpChannelCounterEntry ::= SEQUENCE {
    docsIfCmtsUpChnlCtrId                Integer32,
    docsIfCmtsUpChnlCtrTotalMslots        Counter32,
    docsIfCmtsUpChnlCtrUcastGrantedMslots Counter32,
    docsIfCmtsUpChnlCtrTotalCntnMslots    Counter32,
    docsIfCmtsUpChnlCtrUsedCntnMslots     Counter32,
    docsIfCmtsUpChnlCtrExtTotalMslots     Counter64,
    docsIfCmtsUpChnlCtrExtUcastGrantedMslots Counter64,
    docsIfCmtsUpChnlCtrExtTotalCntnMslots Counter64,
    docsIfCmtsUpChnlCtrExtUsedCntnMslots  Counter64,
    docsIfCmtsUpChnlCtrCollCntnMslots     Counter32,
    docsIfCmtsUpChnlCtrTotalCntnReqMslots Counter32,
    docsIfCmtsUpChnlCtrUsedCntnReqMslots  Counter32,
    docsIfCmtsUpChnlCtrCollCntnReqMslots  Counter32,
    docsIfCmtsUpChnlCtrTotalCntnReqDataMslots Counter32,
    docsIfCmtsUpChnlCtrUsedCntnReqDataMslots Counter32,
    docsIfCmtsUpChnlCtrCollCntnReqDataMslots Counter32,
    docsIfCmtsUpChnlCtrTotalCntnInitMaintMslots Counter32,
    docsIfCmtsUpChnlCtrUsedCntnInitMaintMslots Counter32,
    docsIfCmtsUpChnlCtrCollCntnInitMaintMslots Counter32,
    docsIfCmtsUpChnlCtrExtCollCntnMslots  Counter64,
    docsIfCmtsUpChnlCtrExtTotalCntnReqMslots Counter64,
    docsIfCmtsUpChnlCtrExtUsedCntnReqMslots Counter64,
    docsIfCmtsUpChnlCtrExtCollCntnReqMslots Counter64,
    docsIfCmtsUpChnlCtrExtTotalCntnReqDataMslots Counter64,
    docsIfCmtsUpChnlCtrExtUsedCntnReqDataMslots Counter64,
    docsIfCmtsUpChnlCtrExtCollCntnReqDataMslots Counter64,
    docsIfCmtsUpChnlCtrExtTotalCntnInitMaintMslots Counter64,
    docsIfCmtsUpChnlCtrExtUsedCntnInitMaintMslots Counter64,
    docsIfCmtsUpChnlCtrExtCollCntnInitMaintMslots Counter64
}
```

docsIfCmtsUpChnlCtrId OBJECT-TYPE

SYNTAX Integer32 (0..255)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The CMTS identification of the upstream channel."

::= { docsIfCmtsUpChannelCounterEntry 1 }

docsIfCmtsUpChnlCtrTotalMslots OBJECT-TYPE

SYNTAX Counter32

UNITS "mini-slots"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Current count, from CMTS initialization, of all mini-slots defined for this upstream logical channel. This count includes all IUCs and SIDs, even those allocated to the NULL SID for a 2.0 logical channel that is inactive. This is the 32-bit version of docsIfCmtsUpChnlCtrExtTotalMslots and is included for back compatibility with SNMPv1 managers. Support for this object is mandatory. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 2 }

docsIfCmtsUpChnlCtrUcastGrantedMslots OBJECT-TYPE

SYNTAX Counter32
UNITS "mini-slots"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Current count, from CMTS initialization, of unicast granted mini-slots on the upstream logical channel, regardless of burst type. Unicast granted mini-slots are those in which the CMTS assigned bandwidth to any unicast SID on the logical channel. However, this object does not include minis-lots for reserved IUCs, or grants to SIDs designated as meaning 'no CM'. This is the 32-bit version of docsIfCmtsUpChnlCtrExtUcastGrantedMslots, and is included for back compatibility with SNMPv1 managers. Support for this object is mandatory. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 3 }

docsIfCmtsUpChnlCtrTotalCntnMslots OBJECT-TYPE

SYNTAX Counter32
UNITS "mini-slots"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Current count, from CMTS initialization, of contention mini-slots defined for this upstream logical channel. This count includes all mini-slots assigned to a broadcast or

multicast SID on the logical channel. This is the 32-bit version of docsIfCmtsUpChnlCtrExtTotalCntnMslots, and is included for back compatibility with SNMPv1 managers. Support for this object is mandatory. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

```
::= { docsIfCmtsUpChannelCounterEntry 4 }
```

docsIfCmtsUpChnlCtrUsedCntnMslots OBJECT-TYPE

SYNTAX Counter32
UNITS "mini-slots"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Current count, from CMTS initialization, of contention mini-slots utilized on the upstream logical channel. For contention regions, utilized mini-slots are those in which the CMTS correctly received an upstream burst from any CM on the upstream logical channel. This is the 32-bit version of docsIfCmtsUpChnlCtrExtUsedCntnMslots and is included for back compatibility with SNMPv1 managers. Support for this object is mandatory. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

```
::= { docsIfCmtsUpChannelCounterEntry 5 }
```

docsIfCmtsUpChnlCtrExtTotalMslots OBJECT-TYPE

SYNTAX Counter64
UNITS "mini-slots"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Current count, from CMTS initialization, of all mini-slots defined for this upstream logical channel. This count includes all IUCs and SIDs, even those allocated to the NULL SID for a 2.0 logical channel that is inactive. This is the 64-bit version of docsIfCmtsUpChnlCtrTotalMslots and will not be accessible to SNMPv1 managers. Support for this object is mandatory. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

```
::= { docsIfCmtsUpChannelCounterEntry 6 }
```


docsIfCmtsUpChnlCtrExtUcastGrantedMslots OBJECT-TYPE

SYNTAX Counter64

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of unicast granted mini-slots on the upstream logical channel, regardless of burst type. Unicast granted mini-slots are those in which the CMTS assigned bandwidth to any unicast SID on the logical channel. However, this object does not include mini-slots for reserved IUCs, or grants to SIDs designated as meaning 'no CM'. This is the 64-bit version of docsIfCmtsUpChnlCtrUcastGrantedMslots and will not be accessible to SNMPv1 managers.

Support for this object is mandatory.

Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

ifCounterDiscontinuityTime for the associated ifIndex."

::= { docsIfCmtsUpChannelCounterEntry 7 }

docsIfCmtsUpChnlCtrExtTotalCntnMslots OBJECT-TYPE

SYNTAX Counter64

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention mini-slots defined for this upstream logical channel. This count includes all mini-slots assigned to a broadcast or multicast SID on the logical channel. This is the 64-bit version of docsIfCmtsUpChnlCtrTotalCntnMslots and will not be accessible to SNMPv1 managers.

Support for this object is mandatory.

Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

ifCounterDiscontinuityTime for the associated ifIndex."

::= { docsIfCmtsUpChannelCounterEntry 8 }

docsIfCmtsUpChnlCtrExtUsedCntnMslots OBJECT-TYPE

SYNTAX Counter64

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention

mini-slots utilized on the upstream logical channel. For contention regions, utilized mini-slots are those in which the CMTS correctly received an upstream burst from any CM on the upstream logical channel. This is the 64-bit version of docsIfCmtsUpChnlCtrUsedCntnMslots and will not be accessible to SNMPv1 managers.

Support for this object is mandatory.

Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

ifCounterDiscontinuityTime for the associated ifIndex."

```
::= { docsIfCmtsUpChannelCounterEntry 9 }
```

docsIfCmtsUpChnlCtrCollCntnMslots OBJECT-TYPE

SYNTAX Counter32

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention mini-slots subjected to collisions on the upstream logical channel. For contention regions, these are the mini-slots applicable to bursts that the CMTS detected but could not correctly receive. This is the 32-bit version of docsIfCmtsUpChnlCtrExtCollCntnMslots and is included for back compatibility with SNMPv1 managers.

Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

ifCounterDiscontinuityTime for the associated ifIndex."

```
::= { docsIfCmtsUpChannelCounterEntry 10 }
```

docsIfCmtsUpChnlCtrTotalCntnReqMslots OBJECT-TYPE

SYNTAX Counter32

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention request mini-slots defined for this upstream logical channel. This count includes all mini-slots for IUC1 assigned to a broadcast or multicast SID on the logical channel. This is the 32-bit version of docsIfCmtsUpChnlCtrExtTotalCntnReqMslots and is included for back compatibility with SNMPv1 managers.

Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

```
        ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 11 }
```

docsIfCmtsUpChnlCtrUsedCntnReqMslots OBJECT-TYPE

```
SYNTAX      Counter32
UNITS       "mini-slots"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Current count, from CMTS initialization, of contention
    request mini-slots utilized on this upstream logical
    channel. This count includes all contention mini-slots for
    IUC1 applicable to bursts that the CMTS correctly
    received. This is the 32-bit version of
    docsIfCmtsUpChnlCtrExtUsedCntnReqMslots and is included
    for back compatibility with SNMPv1 managers.
    Discontinuities in the value of this counter can occur
    at reinitialization of the managed system, and at other
    times as indicated by the value of
    ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 12 }
```

docsIfCmtsUpChnlCtrCollCntnReqMslots OBJECT-TYPE

```
SYNTAX      Counter32
UNITS       "mini-slots"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Current count, from CMTS initialization, of contention
    request mini-slots subjected to collisions on this upstream
    logical channel. This includes all contention mini-slots
    for IUC1 applicable to bursts that the CMTS detected but
    could not correctly receive. This is the 32-bit version of
    docsIfCmtsUpChnlCtrExtCollCntnReqMslots and is included
    for back compatibility with SNMPv1 managers.
    Discontinuities in the value of this counter can occur
    at reinitialization of the managed system, and at other
    times as indicated by the value of
    ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 13 }
```

docsIfCmtsUpChnlCtrTotalCntnReqDataMslots OBJECT-TYPE

```
SYNTAX      Counter32
UNITS       "mini-slots"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Current count, from CMTS initialization, of contention
```

request data mini-slots defined for this upstream logical channel. This count includes all mini-slots for IUC2 assigned to a broadcast or multicast SID on the logical channel. This is the 32-bit version of docsIfCmtsUpChnlCtrExtTotalCntnReqDataMslots and is included for back compatibility with SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

```
::= { docsIfCmtsUpChannelCounterEntry 14 }
```

docsIfCmtsUpChnlCtrUsedCntnReqDataMslots OBJECT-TYPE

SYNTAX Counter32

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention request data mini-slots utilized on this upstream logical channel. This includes all contention mini-slots for IUC2 applicable to bursts that the CMTS correctly received. This is the 32-bit version of docsIfCmtsUpChnlCtrExtUsedCntnReqDataMslots and is included for back compatibility with SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

```
::= { docsIfCmtsUpChannelCounterEntry 15 }
```

docsIfCmtsUpChnlCtrCollCntnReqDataMslots OBJECT-TYPE

SYNTAX Counter32

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention request data mini-slots subjected to collisions on this upstream logical channel. This includes all contention mini-slots for IUC2 applicable to bursts that the CMTS detected, but could not correctly receive. This is the 32-bit version of docsIfCmtsUpChnlCtrExtCollCntnReqDataMslots and is included for back compatibility with SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

```

        ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 16 }

```

docsIfCmtsUpChnlCtrTotalCntnInitMaintMslots OBJECT-TYPE

```

SYNTAX      Counter32
UNITS       "mini-slots"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Current count, from CMTS initialization, of contention
     initial maintenance mini-slots defined for this upstream
     logical channel. This includes all mini-slots for IUC3
     assigned to a broadcast or multicast SID on the logical
     channel. This is the 32-bit version of
     docsIfCmtsUpChnlCtrExtTotalCntnInitMaintMslots
     and is included for back compatibility with SNMPv1
     managers.
     Discontinuities in the value of this counter can occur
     at reinitialization of the managed system, and at other
     times as indicated by the value of
     ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 17 }

```

docsIfCmtsUpChnlCtrUsedCntnInitMaintMslots OBJECT-TYPE

```

SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Current count, from CMTS initialization, of contention
     initial maintenance mini-slots utilized on this upstream
     logical channel. This includes all contention mini-slots
     for IUC3 applicable to bursts that the CMTS correctly
     received. This is the 32-bit version of
     docsIfCmtsUpChnlCtrExtUsedCntnInitMaintMslots
     and is included for back compatibility with SNMPv1
     managers.
     Discontinuities in the value of this counter can occur
     at reinitialization of the managed system, and at other
     times as indicated by the value of
     ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 18 }

```

docsIfCmtsUpChnlCtrCollCntnInitMaintMslots OBJECT-TYPE

```

SYNTAX      Counter32
UNITS       "mini-slots"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION

```

"Current count, from CMTS initialization, of contention initial maintenance mini-slots subjected to collisions on this upstream logical channel. This includes all contention mini-slots for IUC3 applicable to bursts that the CMTS detected, but could not correctly receive. This is the 32-bit version of docsIfCmtsUpChnlCtrExtCollCntnInitMaintMslots and is included for back compatibility with SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

```
::= { docsIfCmtsUpChannelCounterEntry 19 }
```

docsIfCmtsUpChnlCtrExtCollCntnMslots OBJECT-TYPE

SYNTAX Counter64

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of collision contention mini-slots on the upstream logical channel. For contention regions, these are the mini-slots applicable to bursts that the CMTS detected, but could not correctly receive. This is the 64-bit version of docsIfCmtsUpChnlCtrCollCntnMslots and will not be accessible to SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

```
::= { docsIfCmtsUpChannelCounterEntry 20 }
```

docsIfCmtsUpChnlCtrExtTotalCntnReqMslots OBJECT-TYPE

SYNTAX Counter64

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention request mini-slots defined for this upstream logical channel. This count includes all mini-slots for IUC1 assigned to a broadcast or multicast SID on the logical channel. This is the 64-bit version of docsIfCmtsUpChnlCtrTotalCntnReqMslots and will not be accessible to SNMPv1 managers. Discontinuities in the value of this counter can occur

at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 21 }

docsIfCmtsUpChnlCtrExtUsedCntnReqMslots OBJECT-TYPE

SYNTAX Counter64

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention request mini-slots utilized on this upstream logical channel. This count includes all contention mini-slots for IUC1 applicable to bursts that the CMTS correctly received. This is the 64-bit version of docsIfCmtsUpChnlCtrUsedCntnReqMslots and will not be accessible to SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

::= { docsIfCmtsUpChannelCounterEntry 22 }

docsIfCmtsUpChnlCtrExtCollCntnReqMslots OBJECT-TYPE

SYNTAX Counter64

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention request mini-slots subjected to collisions on this upstream logical channel. This includes all contention mini-slots for IUC1 applicable to bursts that the CMTS detected, but could not correctly receive. This is the 64-bit version of docsIfCmtsUpChnlCtrCollCntnReqMslots and will not be accessible to SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

::= { docsIfCmtsUpChannelCounterEntry 23 }

docsIfCmtsUpChnlCtrExtTotalCntnReqDataMslots OBJECT-TYPE

SYNTAX Counter64

UNITS "mini-slots"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention request data mini-slots defined for this upstream logical channel. This count includes all mini-slots for IUC2 assigned to a broadcast or multicast SID on the logical channel. This is the 64-bit version of docsIfCmtsUpChnlCtrTotalCntnReqDataMslots and will not be accessible to SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

::= { docsIfCmtsUpChannelCounterEntry 24 }

docsIfCmtsUpChnlCtrExtUsedCntnReqDataMslots OBJECT-TYPE

SYNTAX Counter64
 UNITS "mini-slots"
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention request data mini-slots utilized on this upstream logical channel. This includes all contention mini-slots for IUC2 applicable to bursts that the CMTS correctly received. This is the 64-bit version of docsIfCmtsUpChnlCtrUsedCntnReqDataMslots and will not be accessible to SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."

::= { docsIfCmtsUpChannelCounterEntry 25 }

docsIfCmtsUpChnlCtrExtCollCntnReqDataMslots OBJECT-TYPE

SYNTAX Counter64
 UNITS "mini-slots"
 MAX-ACCESS read-only
 STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention request data mini-slots subjected to collisions on this upstream logical channel. This includes all contention mini-slots for IUC2 applicable to bursts that the CMTS detected, but could not correctly receive. This is the 64-bit version of docsIfCmtsUpChnlCtrCollCntnReqDataMslots and will not be accessible to SNMPv1 managers. Discontinuities in the value of this counter can occur

at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 26 }

docsIfCmtsUpChnlCtrExtTotalCntnInitMaintMslots OBJECT-TYPE

SYNTAX Counter64
UNITS "mini-slots"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Current count, from CMTS initialization, of initial maintenance mini-slots defined for this upstream logical channel. This count includes all mini-slots for IUC3 assigned to a broadcast or multicast SID on the logical channel. This is the 64-bit version of docsIfCmtsUpChnlCtrTotalCntnInitMaintMslots and will not be accessible to SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 27 }

docsIfCmtsUpChnlCtrExtUsedCntnInitMaintMslots OBJECT-TYPE

SYNTAX Counter64
UNITS "mini-slots"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Current count, from CMTS initialization, of initial maintenance mini-slots utilized on this upstream logical channel. This includes all contention mini-slots for IUC3 applicable to bursts that the CMTS correctly received. This is the 64-bit version of docsIfCmtsUpChnlCtrUsedCntnInitMaintMslots and will not be accessible to SNMPv1 managers. Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of ifCounterDiscontinuityTime for the associated ifIndex."
 ::= { docsIfCmtsUpChannelCounterEntry 28 }

docsIfCmtsUpChnlCtrExtCollCntnInitMaintMslots OBJECT-TYPE

SYNTAX Counter64
UNITS "mini-slots"
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Current count, from CMTS initialization, of contention initial maintenance mini-slots subjected to collisions on this upstream logical channel. This includes all contention mini-slots for IUC3 applicable to bursts that the CMTS detected, but could not correctly receive.

This is the 64-bit version of docsIfCmtsUpChnlCtrCollCntnInitMaintMslots and will not be accessible to SNMPv1 managers.

Discontinuities in the value of this counter can occur at reinitialization of the managed system, and at other times as indicated by the value of

ifCounterDiscontinuityTime for the associated ifIndex."

```
::= { docsIfCmtsUpChannelCounterEntry 29 }
```

```
--
```

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

```
--
```

```
docsIfNotification OBJECT IDENTIFIER ::= { docsIfMib 2 }
```

```
--
```

```
-- MIB Compliance statements.
```

```
--
```

```
--
```

```
-- Conformance definitions
```

```
--
```

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

```
docsIfBasicCompliance MODULE-COMPLIANCE
```

```
STATUS deprecated
```

```
DESCRIPTION
```

```
"The compliance statement for devices that implement
DOCSIS 1.x 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 important 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 standards (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 standards (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

WRITE-SYNTAX BITS {
 createByManagement(0),
 updateByManagement(1)
}

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

"A management station MAY only set 16QAM or QPSK modulation,
but others might be possible, based on device
configuration."

OBJECT docsIfCmtsModPreambleLen

SYNTAX Integer32 (0..1024)

DESCRIPTION

"The range of the values for this MODULE-COMPLIANCE
is 0..1024."

OBJECT docsIfCmtsModFECErrorCorrection

SYNTAX Integer32 (0..10)

DESCRIPTION

"The range of the values for this MODULE-COMPLIANCE
is 0..10."

::= { docsIfCompliances 1 }

docsIfBasicComplianceV2 MODULE-COMPLIANCE

STATUS current

DESCRIPTION

"The compliance statement for devices that implement
DOCSIS 2.0 Radio Frequency Interfaces."

MODULE -- docsIfMib

-- unconditionally mandatory groups

MANDATORY-GROUPS {
 docsIfBasicGroupV2
}

-- conditionally mandatory group

GROUP docsIfCmGroupV2

DESCRIPTION

"This group is implemented only in cable modems, not in cable modem termination systems."

-- conditionally mandatory group

GROUP docsIfCmtsGroupV2

DESCRIPTION

"This group is implemented only in cable modem termination systems, not in cable modems."

OBJECT docsIfDownChannelFrequency

WRITE-SYNTAX Integer32 (47000000..862000000)

MIN-ACCESS read-only

DESCRIPTION

"Read-write in cable modem termination systems; read-only in cable modems.

A range of 54MHz to 860MHz is appropriate for a cable plant using a North American Sub-Split channel plan.

The spectrum range has been expanded to accommodate a lower edge of 47MHz and an upper edge of 862MHz for some European channel plans.

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 | 8000000)

MIN-ACCESS read-only

DESCRIPTION

"It is important to implement this object as read-only.

In cable modems, this object is always implemented as read-only. The value of 6 MHz is appropriate for cable plants running under NTSC (National Television Standards Committee) standards. The value of 8 MHz is appropriate for cable plants running under ETSI standards. For other regional 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),
 taps12increment17(8)
}

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..65000000)

MIN-ACCESS read-only

DESCRIPTION

"Read-create in cable modem termination systems;
read-only in cable modems.
A range of 5MHz to 42MHz is appropriate for a cable
plant using a North American Sub-Split channel plan.
The spectrum range has been expanded to accommodate
an upper edge of 65MHz for some European channel plans.
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..6400000)

MIN-ACCESS read-only

DESCRIPTION

"Read-create 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 standards (e.g., European standards), this
object will be modified accordingly."

OBJECT docsIfUpChannelModulationProfile
MIN-ACCESS read-only
DESCRIPTION
 "Read-create 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-create in cable modem termination systems;
 read-only in cable modems."

OBJECT docsIfUpChannelRangingBackoffEnd
MIN-ACCESS read-only
DESCRIPTION
 "Read-create in cable modem termination systems;
 read-only in cable modems."

OBJECT docsIfUpChannelTxBackoffStart
MIN-ACCESS read-only
DESCRIPTION
 "Read-create in cable modem termination systems;
 read-only in cable modems."

OBJECT docsIfUpChannelTxBackoffEnd
MIN-ACCESS read-only
DESCRIPTION
 "Read-create in cable modem termination systems;
 read-only in cable modems."

OBJECT docsIfUpChannelScdmaActiveCodes
MIN-ACCESS read-only
DESCRIPTION
 "Read-create in cable modem termination systems;
 read-only in cable modems.
 The number of active codes when SCDMA is in use MUST range
 from 64 to 128 and MUST be a non-Prime value.
 Providing this range allows for the following features
 and capabilities:
 1) Power management in S-CDMA spreader-on frames
 (with a 3 dB spread)."

- 2) Avoidance of code 0.
- 3) Flexible mini-slot sizes with and without the use of code 0."

```
OBJECT docsIfUpChannelScdmaCodesPerSlot
  MIN-ACCESS read-only
  DESCRIPTION
    "Read-create in cable modem termination systems;
    read-only in cable modems."

OBJECT docsIfUpChannelScdmaFrameSize
  MIN-ACCESS read-only
  DESCRIPTION
    "Read-create in cable modem termination systems;
    read-only in cable modems."

OBJECT docsIfUpChannelScdmaHoppingSeed
  MIN-ACCESS read-only
  DESCRIPTION
    "Read-create in cable modem termination systems;
    read-only in cable modems."

OBJECT docsIfUpChannelCloneFrom
  MIN-ACCESS read-only
  DESCRIPTION
    "Read-create in cable modem termination systems;
    read-only in cable modems."

OBJECT docsIfUpChannelUpdate
  MIN-ACCESS read-only
  DESCRIPTION
    "Read-create in cable modem termination systems;
    read-only in cable modems."

OBJECT docsIfUpChannelStatus
  MIN-ACCESS read-only
  DESCRIPTION
    "Read-create in Cable Modem Termination Systems;
    read-only in Cable Modems.
    Entries associated to physical interfaces only support
    the read-only value 'active'."

OBJECT docsIfUpChannelPreEqEnable
  MIN-ACCESS read-only
  DESCRIPTION
    "Read-create 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 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 docsIfQosProfMaxTransmitBurst
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 docsIfCmRangingTimeout
  MIN-ACCESS read-only
  DESCRIPTION
    "It is compliant to implement this object as read-only."

OBJECT docsIfCmStatusModulationType
  SYNTAX          INTEGER {
    unknown(0),
    tdma(1),
    atdma(2),
    scdma(3)
  }
  DESCRIPTION
    "CM does not use both modulation burst profiles of a
    'tdmAndAtdma' ChannelType; therefore, 'tdmAndAtdma' is
    not supported."

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
  WRITE-SYNTAX    BITS {
    createByManagement(0),
    updateByManagement(1)
  }
  MIN-ACCESS read-only
```

DESCRIPTION

"It is compliant to implement this object as read-only."

OBJECT docsIfCmtsModType

```
WRITE-SYNTAX      INTEGER {  
    qpsk(2),  
    qam16(3),  
    qam64(6)  
}
```

DESCRIPTION

"A management station MAY only set 64QAM, 16QAM, or QPSK modulation for Time or Code division Multiple Access, but others might be possible based on device configuration."

OBJECT docsIfCmtsCmStatusModulationType

```
SYNTAX            INTEGER {  
    unknown(0),  
    tdma(1),  
    atdma(2),  
    scdma(3)  
}
```

DESCRIPTION

"CM does not use both modulation burst profiles of a 'tdmAndAtdma' ChannelType; therefore, 'tdmAndAtdma' is not supported."

::= { docsIfCompliances 2 }

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,
docsIfSigQUnerrored,
docsIfSigQCorrected,
docsIfSigQUncorrectable,
docsIfSigQSignalNoise,
docsIfSigQMicroreflections,
docsIfSigQEqualizationData
}
STATUS      deprecated
DESCRIPTION
    "Group of objects implemented in both cable modems and
    cable modem termination systems."
 ::= { docsIfGroups 1 }
```

docsIfCmGroup OBJECT-GROUP

```
OBJECTS {
    docsIfCmCmtsAddress,
    docsIfCmCapabilities,
    docsIfCmRangingTimeout,
    docsIfCmStatusValue,
    docsIfCmStatusCode,
    docsIfCmStatusTxPower,
    docsIfCmStatusResets,
    docsIfCmStatusLostSyncs,
    docsIfCmStatusInvalidMaps,
    docsIfCmStatusInvalidUcds,
    docsIfCmStatusInvalidRangingResponses,
    docsIfCmStatusInvalidRegistrationResponses,
    docsIfCmStatusT1Timeouts,
    docsIfCmStatusT2Timeouts,
    docsIfCmStatusT3Timeouts,
    docsIfCmStatusT4Timeouts,
    docsIfCmStatusRangingAborted,
    docsIfCmServiceQosProfile,
    docsIfCmServiceTxSlotsImmed,
    docsIfCmServiceTxSlotsDed,
    docsIfCmServiceTxRetries,
    docsIfCmServiceTxExceeded,
    docsIfCmServiceRqRetries,
    docsIfCmServiceRqExceeded
}
STATUS      deprecated
```

DESCRIPTION

"Group of objects implemented in cable modems."
 ::= { docsIfGroups 2 }

docsIfCmtsGroup OBJECT-GROUP

OBJECTS {
 docsIfCmtsCapabilities,
 docsIfCmtsSyncInterval,
 docsIfCmtsUcdInterval,
 docsIfCmtsMaxServiceIds,
 docsIfCmtsInvitedRangingAttempts,
 docsIfCmtsInsertInterval,
 docsIfCmtsStatusInvalidRangeReqs,
 docsIfCmtsStatusRangingAborted,
 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      deprecated
    DESCRIPTION
        "Group of objects implemented in Cable Modem Termination
        Systems."
    ::= { docsIfGroups 3 }

-- obsolete group
-- RFC 2670 already had a obsolete group, even though RFC2670
-- was the first version of this MIB Module.

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

docsIfBasicGroupV2 OBJECT-GROUP
    OBJECTS {
        docsIfDownChannelId,
        docsIfDownChannelFrequency,
        docsIfDownChannelWidth,
        docsIfDownChannelModulation,
        docsIfDownChannelInterleave,
        docsIfDownChannelPower,
        docsIfDownChannelAnnex,
        docsIfUpChannelId,
        docsIfUpChannelFrequency,
        docsIfUpChannelWidth,
        docsIfUpChannelModulationProfile,
        docsIfUpChannelSlotSize,
        docsIfUpChannelTxTimingOffset,
        docsIfUpChannelRangingBackoffStart,
        docsIfUpChannelRangingBackoffEnd,
        docsIfUpChannelTxBackoffStart,
        docsIfUpChannelTxBackoffEnd,
        docsIfUpChannelScdmaActiveCodes,
        docsIfUpChannelScdmaCodesPerSlot,
        docsIfUpChannelScdmaFrameSize,
        docsIfUpChannelScdmaHoppingSeed,
        docsIfUpChannelType,
        docsIfUpChannelCloneFrom,
```

```
docsIfUpChannelUpdate,
docsIfUpChannelStatus,
docsIfUpChannelPreEqEnable,
docsIfQosProfPriority,
docsIfQosProfMaxUpBandwidth,
docsIfQosProfGuarUpBandwidth,
docsIfQosProfMaxDownBandwidth,
docsIfQosProfBaselinePrivacy,
docsIfQosProfStatus,
docsIfQosProfMaxTransmitBurst,
docsIfSigQIncludesContention,
docsIfSigQUnerrored,
docsIfSigQCorrected,
docsIfSigQUncorrectable,
docsIfSigQSignalNoise,
docsIfSigQMicroreflections,
docsIfSigQExtUnerrored,
docsIfSigQExtCorrected,
docsIfSigQExtUncorrectable,
docsIfDocsisBaseCapability
}
STATUS          current
DESCRIPTION
    "Group of objects implemented in both cable modems and
    cable modem termination systems."
 ::= { docsIfGroups 5 }
```

docsIfCmGroupV2 OBJECT-GROUP

```
OBJECTS {
    docsIfCmCmtsAddress,
    docsIfCmCapabilities,
    docsIfCmRangingTimeout,
    docsIfCmStatusValue,
    docsIfCmStatusCode,
    docsIfCmStatusTxPower,
    docsIfCmStatusResets,
    docsIfCmStatusLostSynchs,
    docsIfCmStatusInvalidMaps,
    docsIfCmStatusInvalidUcds,
    docsIfCmStatusInvalidRangingResponses,
    docsIfCmStatusInvalidRegistrationResponses,
    docsIfCmStatusT1Timeouts,
    docsIfCmStatusT2Timeouts,
    docsIfCmStatusT3Timeouts,
    docsIfCmStatusT4Timeouts,
    docsIfCmStatusRangingAborted,
    docsIfCmStatusDocsisOperMode,
    docsIfCmStatusModulationType,
```

```
docsIfCmStatusEqualizationData,
docsIfCmStatusUCCs,
docsIfCmStatusUCCFails,
docsIfCmServiceQosProfile,
docsIfCmServiceTxSlotsImmed,
docsIfCmServiceTxSlotsDed,
docsIfCmServiceTxRetries,
docsIfCmServiceTxExceededs,
docsIfCmServiceRqRetries,
docsIfCmServiceRqExceededs,
docsIfCmServiceExtTxSlotsImmed,
docsIfCmServiceExtTxSlotsDed,
docsIfSigQEqualizationData
}
STATUS          current
DESCRIPTION
    "Group of objects implemented in cable modems."
 ::= { docsIfGroups 6 }
```

```
docsIfCmtsGroupV2 OBJECT-GROUP
OBJECTS {
    docsIfCmtsCapabilities,
    docsIfCmtsSyncInterval,
    docsIfCmtsUcdInterval,
    docsIfCmtsMaxServiceIds,
    docsIfCmtsInvitedRangingAttempts,
    docsIfCmtsInsertInterval,
    docsIfCmtsMacStorageType,
    docsIfCmtsStatusInvalidRangeReqs,
    docsIfCmtsStatusRangingAborted,
    docsIfCmtsStatusInvalidRegReqs,
    docsIfCmtsStatusFailedRegReqs,
    docsIfCmtsStatusInvalidDataReqs,
    docsIfCmtsStatusT5Timeouts,
    docsIfCmtsCmStatusMacAddress,
    docsIfCmtsCmStatusDownChannelIfIndex,
    docsIfCmtsCmStatusUpChannelIfIndex,
    docsIfCmtsCmStatusRxPower,
    docsIfCmtsCmStatusTimingOffset,
    docsIfCmtsCmStatusEqualizationData,
    docsIfCmtsCmStatusValue,
    docsIfCmtsCmStatusUnerrored,
    docsIfCmtsCmStatusCorrected,
    docsIfCmtsCmStatusUncorrectable,
    docsIfCmtsCmStatusSignalNoise,
    docsIfCmtsCmStatusMicroreflections,
    docsIfCmtsCmStatusExtUnerrored,
    docsIfCmtsCmStatusExtCorrected,
}
```

```
docsIfCmtsCmStatusExtUncorrectables,
docsIfCmtsCmStatusDocsisRegMode,
docsIfCmtsCmStatusModulationType,
docsIfCmtsCmStatusInetAddressType,
docsIfCmtsCmStatusInetAddress,
docsIfCmtsCmStatusValueLastUpdate,
docsIfCmtsCmStatusHighResolutionTimingOffset,
docsIfCmtsServiceAdminStatus,
docsIfCmtsServiceQosProfile,
docsIfCmtsServiceCreateTime,
docsIfCmtsServiceInOctets,
docsIfCmtsServiceInPackets,
docsIfCmtsServiceNewCmStatusIndex,
docsIfCmtsModType,
docsIfCmtsModControl,
docsIfCmtsModPreambleLen,
docsIfCmtsModDifferentialEncoding,
docsIfCmtsModFECErrorCorrection,
docsIfCmtsModFECCodeWordLength,
docsIfCmtsModScramblerSeed,
docsIfCmtsModMaxBurstSize,
docsIfCmtsModGuardTimeSize,
docsIfCmtsModLastCodewordShortened,
docsIfCmtsModScrambler,
docsIfCmtsModByteInterleaverDepth,
docsIfCmtsModByteInterleaverBlockSize,
docsIfCmtsModPreambleType,
docsIfCmtsModTcmErrorCorrectionOn,
docsIfCmtsModScdmaInterleaverStepSize,
docsIfCmtsModScdmaSpreaderEnable,
docsIfCmtsModScdmaSubframeCodes,
docsIfCmtsModChannelType,
docsIfCmtsModStorageType,
docsIfCmtsQosProfilePermissions,
docsIfCmtsCmPtr,
docsIfCmtsChannelUtilizationInterval,
docsIfCmtsChannelUtUtilization,
docsIfCmtsDownChnlCtrId,
docsIfCmtsDownChnlCtrTotalBytes,
docsIfCmtsDownChnlCtrUsedBytes,
docsIfCmtsDownChnlCtrExtTotalBytes,
docsIfCmtsDownChnlCtrExtUsedBytes,
docsIfCmtsUpChnlCtrId,
docsIfCmtsUpChnlCtrTotalMslots,
docsIfCmtsUpChnlCtrUcastGrantedMslots,
docsIfCmtsUpChnlCtrTotalCntnMslots,
docsIfCmtsUpChnlCtrUsedCntnMslots,
docsIfCmtsUpChnlCtrExtTotalMslots,
```

```

docsIfCmtsUpChnlCtrExtUcastGrantedMslots,
docsIfCmtsUpChnlCtrExtTotalCntnMslots,
docsIfCmtsUpChnlCtrExtUsedCntnMslots,
docsIfCmtsUpChnlCtrCollCntnMslots,
docsIfCmtsUpChnlCtrTotalCntnReqMslots,
docsIfCmtsUpChnlCtrUsedCntnReqMslots,
docsIfCmtsUpChnlCtrCollCntnReqMslots,
docsIfCmtsUpChnlCtrTotalCntnReqDataMslots,
docsIfCmtsUpChnlCtrUsedCntnReqDataMslots,
docsIfCmtsUpChnlCtrCollCntnReqDataMslots,
docsIfCmtsUpChnlCtrTotalCntnInitMaintMslots,
docsIfCmtsUpChnlCtrUsedCntnInitMaintMslots,
docsIfCmtsUpChnlCtrCollCntnInitMaintMslots,
docsIfCmtsUpChnlCtrExtCollCntnMslots,
docsIfCmtsUpChnlCtrExtTotalCntnReqMslots,
docsIfCmtsUpChnlCtrExtUsedCntnReqMslots,
docsIfCmtsUpChnlCtrExtCollCntnReqMslots,
docsIfCmtsUpChnlCtrExtTotalCntnReqDataMslots,
docsIfCmtsUpChnlCtrExtUsedCntnReqDataMslots,
docsIfCmtsUpChnlCtrExtCollCntnReqDataMslots,
docsIfCmtsUpChnlCtrExtTotalCntnInitMaintMslots,
docsIfCmtsUpChnlCtrExtUsedCntnInitMaintMslots,
docsIfCmtsUpChnlCtrExtCollCntnInitMaintMslots,
docsIfDownChannelStorageType,
docsIfQosProfStorageType

}
STATUS          current
DESCRIPTION
    "Group of objects implemented in Cable Modem Termination
    Systems."
::= { docsIfGroups 7 }

```

END

5. Revision History

5.1. Scope

The MIB module in this document has been developed to accommodate DOCSIS 2.0 devices and their system capabilities. The MIB module is an update to RFC 2670 [RFC2670] with the additional incorporation of DOCSIS 2.0 [RFI2.0] and Euro-DOCSIS specification requirements [EN-300-429].

5.2. Extension

We have maintained the MIB objects as defined in RFC 2670 [RFC2670]. In some cases new MIB objects have been created with identical functionality but greater capacity (i.e., 32 to 64 bits). In these situations, both the original 32 bit objects and the new 64 bit objects must be implemented.

6. Security Considerations

This MIB module relates to a system that will provide metropolitan public internet access. As such, improper manipulation of the MIB objects represented by this MIB module may result in denial of service to a large number of end-users.

There are a number of management objects defined in this MIB that have a MAX-ACCESS clause of read-write or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

The CMTS is the controller of most of the parameters of the DOCSIS RFI Interface. Therefore, write access to the CMTS MIB objects may compromise the end-user's services.

In the CM case, the only read-write object of this MIB module is docsIfCmRangingTimeout, which if SET maliciously, may not constitute a critical factor of service degradation.

The rest of the CM-required MIB objects in this MIB module are read-only, either by definition, or by compliance statements.

The CMTS is the controller of most of the parameters of the DOCSIS RFI Interface. Below are the CMTS MIB object's vulnerabilities:

- o Objects in the docsIfBasicGroupv2, if SET maliciously, could result in a denial of service. Particularly, SETs to objects in

docsIfDownstreamChannelTable, docsIfUpstreamChannelTable, docsIfCmtsModulationTable, and docsIfQosProfileTable (the last one in conjunction with the MIB object docsIfCmtsQosProfilePermissions) can alter negatively the physical and link layer parameters of upstream and downstream channels.

- o The Object docsIfCmtsServiceAdminStatus of the docsIfCmtsGroupv2 group, when SET maliciously by an attacker to 'disabled' or 'destroyed', will interrupt the service of the corresponding cable modem.

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. Below are some sensitivity considerations:

- o Read access to the MIB objects in tables docsIfCmStatusTable (CM), docsIfSignalQualityTable (CM/CMTS) and in CMTS tables docsIfCmtsCmStatusTable, docsIfCmtsChannelUtilizationTable, docsIfCmtsDownChannelCounterTable, and docsIfCmtsUpChannelCounterTable, could reveal information about the cable modems' distribution among the upstream and downstream channels and their performance, which could be used to gain access to a different tiered service offer. The table docsIfCmtsCmStatusTable also contains the MAC and IP addresses of the cable modems, which can be used for theft of service.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPSec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

7. Management Interoperability of DOCSIS 1.0, 1.1, and 2.0

The MIB module contained in this document updates RFC 2670 [RFC2670], primarily to handle the management requirements of the DOCSIS RF Interface of DOCSIS 2.0 [ITU-T_J.122]. RFC 2670 contains the DOCSIS RF Interface management requirements for DOCSIS 1.0 and DOCSIS 1.1.

The management requirements of Class of Service (DOCSIS 1.0) pertaining to RFC 2670 are the same as this document update and are contained in the tables docsIfQosProfileTable, docsIfCmServiceTable, and docsIfCmtsServiceTable.

DOCSIS 1.1 and DOCSIS 2.0 Quality of Service management requirements are defined in the DOCSIS management specifications [OSSI1.1] and [OSSI2.0], respectively.

8. References

8.1. Normative References

- [EN-300-429] European Telecommunications Standard Institute, "ETSI Standard EN 300 429, Version 1.2.1: Digital Video Broadcasting (DVB), Framing structure, channel coding and modulation for cable systems", April 1998.
- [IANA] Internet Assigned Numbers Authority, "Internet Assigned Numbers Authority", October 2005, <<http://www.iana.org/assignments/ianaiftype-mib/>>.
- [ITU-T_J.112] Telecommunication Standardization Sector of International Telecommunications Union, "Transmission Systems for Interactive Cable Television Services, Annex B.", March 2001, <<http://www.itu.int/ITU-T/studygroups/com09/>>.
- [ITU-T_J.122] Telecommunication Standardization Sector of International Telecommunications Union, "Second-Generation Transmission Systems for Interactive Cable Television Services.", December 2002, <<http://www.itu.int/ITU-T/studygroups/com09/>>.
- [ITU-T_J.83] Telecommunication Standardization Sector of International Telecommunications Union, "ITU-T Recommendation J.83(4/97), Digital multi-programme systems for television sound and data services for cable distribution.", April 1997, <<http://www.itu.int/ITU-T/studygroups/com09/>>.

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [RFC2578] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.
- [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, June 2000.
- [RFC4001] Daniele, M., Haberman, B., Routhier, S., and J. Schoenwaelder, "Textual Conventions for Internet Network Addresses", RFC 4001, February 2005.
- [RFI1.1] CableLabs, "Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV1.1-C01-050907", September 2005, <<http://www.cablemodem.com/specifications/>>.
- [RFI2.0] CableLabs, "Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFIV2.0-I09-050812", August 2005, <<http://www.cablemodem.com/specifications/>>.

8.2. Informative References

- [BPI] SCTE Data Standards Subcommittee, "Data-Over-Cable Service Interface Specifications: DOCSIS 1.0 Baseline Privacy Interface Specification SCTE 22-2 2002", 2002, <<http://www.scte.org/standards/>>.
- [BPIPLUS] CableLabs, "Data-Over-Cable Service Interface Specifications: Baseline Privacy Plus Interface Specification SP-BPI+-I12-050812", August 2005, <<http://www.cablemodem.com/specifications/>>.
- [OSSI1.1] CableLabs, "Data-Over-Cable Service Interface Specifications: Operations Support System Interface Specification SP-OSSIV1.1-C01-050907", September 2005, <<http://www.cablemodem.com/specifications/>>.

- [OSSI2.0] CableLabs, "Data-Over-Cable Service Interface Specifications: Operations Support System Interface Specification SP-OSSIV2.0-I09-050812", September 2005, <<http://www.cablemodem.com/specifications/>>.
- [Proakis00] McGraw-Hill, "Digital Communications, 4th Edition", 2000.
- [RFC2670] St. Johns, M., "Radio Frequency (RF) Interface Management Information Base for MCNS/DOCSIS compliant RF interfaces", RFC 2670, August 1999.
- [RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.
- [RFI1.0] SCTE Data Standards Subcommittee, "Data-Over-Cable Service Interface Specifications: DOCSIS 1.0 Radio Frequency Interface Specification SCTE 22-1 2002", 2002, <<http://www.scte.org/standards/>>.

Authors' Addresses

David Raftus
ATI Technologies
340 Terry Fox Drive, Suite 202
Ottawa, Ontario
Canada

Phone: +1 613 592 1052 ext.222
EMail: david.raftus@ati.com

Eduardo Cardona
Cable Television Laboratories, Inc.
858 Coal Creek Circle
Louisville, CO 80020
USA

Phone: +1 303 661 3375
EMail: e.cardona@cablelabs.com

Full Copyright Statement

Copyright (C) The Internet Society (2006).

This document is subject to the rights, licenses and restrictions contained in BCP 78, and except as set forth therein, the authors retain all their rights.

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM 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.

Intellectual Property

The IETF takes no position regarding the validity or scope of any Intellectual Property Rights 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; nor does it represent that it has made any independent effort to identify any such rights. Information on the procedures with respect to rights in RFC documents can be found in BCP 78 and BCP 79.

Copies of IPR disclosures made to the IETF Secretariat 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 implementers or users of this specification can be obtained from the IETF on-line IPR repository at <http://www.ietf.org/ipr>.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at ietf-ipr@ietf.org.

Acknowledgement

Funding for the RFC Editor function is provided by the IETF Administrative Support Activity (IASA).

