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Cable Device Management Information Base for  
Data-Over-Cable Service Interface Specification (DOCSIS)  
Compliant Cable Modems and Cable Modem Termination Systems

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.

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it defines a basic set of managed objects for Simple Network Management Protocol (SNMP)-based management of Data Over Cable Service Interface Specification (DOCSIS)-compliant Cable Modems and Cable Modem Termination Systems.

This memo obsoletes RFC 2669.

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## 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] and 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 (DOCSIS) process.

### 2.1. CATV

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

### 2.2. CM or Cable Modem

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

### 2.3. 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.

### 2.4. DOCSIS or Data-Over-Cable Service Interface Specification

A term referring to the ITU-T Recommendation J.112 [ITU-T\_J.112], Annex B, standard for cable modem systems. [RFI1.0] [RFI1.1] [RFI2.0]

## 2.5. Downstream

The direction from the head-end towards the subscriber.

## 2.6. Head-End

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

## 2.7. Media Access Control (MAC) Packet

A DOCSIS Packet Data Unit.

## 2.8. RF

Radio Frequency.

## 2.9. Simple Network Management Protocol (SNMP)

Protocol used for network access to Management Information Base (MIB) objects. The three most commonly used versions are Version 1 (SNMPv1), Version 2 (SNMPv2c), and Version 3 (SNMPv3).

## 2.10. Upstream

The direction from the subscriber towards the head-end.

## 3. Introduction

This MIB module provides a set of objects required for the management of DOCSIS-compliant Cable Modems (CM) and Cable Modem Termination Systems (CMTS). The specification is derived from the DOCSIS Radio Frequency Interface specification [RFI1.0]. Please note that the DOCSIS 1.0 standard only required that Cable Modems implement SNMPv1 and to process Internet Protocol Version 4 (IPv4) customer traffic. Design choices in the original version of this MIB module reflected those requirements. DOCSIS 1.1 [RFI1.1] and DOCSIS 2.0 [RFI2.0] require support for SNMPv3, as well as for SNMPv1 and SNMPv2c, and the changes in this MIB module over the previous proposed standard version reflect those additional requirements.

Future versions of DOCSIS, starting with DOCSIS 3.0 [MULPI3.0], are expected to require support for the Internet Protocol Version 6 (IPv6) as both a Customer Premise Equipment (CPE) protocol and one supported by the network elements of the DOCSIS CMTS/CM system.

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

### 3.1. Structure of the MIB

This MIB module is structured into seven components. A component contains one or more MIB groups related by deprecation or logical extension.

- o The docsDevBaseGroup extends the MIB-II 'system' group of RFC3418 [RFC3418] with objects needed for cable device system management. Related to this group is the docsDevBaseIgmpGroup (enabling Internet Group Management Protocol (IGMP) status and control) and the docsDevBaseMaxCpeGroup (managing the maximum number of CPEs permitted access through the cable modem).
- o The docsDevNmAccessGroup and the docsDevNmAccessExtGroup provide a minimum level of SNMP access security (see Section 2.7 of [OSSI1.0], Section 2 of [OSSI1.1], and Section 5 of [OSSI2.0]). With the completion of the SNMP coexistence document, RFC 3584 [RFC3584], these groups have been deprecated in this version of the MIB.
- o The docsDevSoftwareGroup, updated by the docsDevSoftwareGroupV2, provides information for network-downloadable software upgrades. See "Handling of Software Upgrades", below.
- o The docsDevServerGroup, updated by the docsDevServerGroupV2, provides information about the progress of the interaction between the CM or CMTS and various provisioning servers.
- o The docsDevEventGroup, updated by the docsDevEventGroupV2, provides control and logging for event reporting. With the addition of the SNMP Notification MIB, RFC 3413 [RFC3413], and Notification Log MIB, RFC 3014 [RFC3014], which cover event reporting, the objects in this MIB module have been modified to allow for the usage of these RFCs.
- o The docsDevFilterGroup configures filters at the link layer and IP layer for bridged data traffic. This group has been deprecated in this version of the MIB in favor of the docsDevFilterLLCGroup, and by groups from the Differentiated Services MIB [RFC3289] -- specifically, the groups representing the Data Path, Classifier, and Actions tables from that MIB.

- o The docsDevCpeGroup, updated by the docsDevInetCpeGroup, provides control over which IP addresses may be used by CPEs (e.g., PCs) serviced by a given cable modem. This provides anti-spoofing control at the point of origin for a large cable modem system. This group is separate from docsDevFilter, primarily as this group is only implemented on the Cable Modem (CM) and MUST NOT be implemented on the Cable Modem Termination System (CMTS).

### 3.1.1. IMPORTed MIB Modules and REFERENCE Clauses

This MIB module IMPORTs definitions normatively from the following MIB modules, beyond [RFC2578], [RFC2579], and [RFC2580]: INET-ADDRESS-MIB [RFC4001], SNMP-FRAMEWORK-MIB [RFC3411], IF-MIB [RFC2863], RMON2-MIB [RFC4502], and DIFFSERV-MIB [RFC3289].

This MIB module also includes DESCRIPTION and REFERENCE clauses that normatively refer to [RFC868], [RFC3617], [RFI1.0], [RFI1.1], [RFI2.0], [OSSI1.1], and [OSSI2.0].

### 3.1.2. Persistence Model for Cable Modems

Most of the tables in this MIB module (e.g., docsDevNmAccessTable, docsDevFilterLLCTable) are specified not to let objects persist across reboots.

The expectation (and current operational practice) is that upon reboot, these tables are cleared and repopulated from the DOCSIS configuration file supplied by the cable operator. This approach enables a cable modem to adapt to the current cable operator's environment, which in turn enables cable modem portability across different cable operators.

A notable exception to the persistence model is docsDevEventTable, since it is useful to maintain a record of events across reboots for debugging purposes.

### 3.1.3. IPv4 Compliance

Please note that the compliance statements in this version of the MIB module require support only for IPv4 addresses. That is because the current versions of the DOCSIS protocols (1.0, 1.1, and 2.0) are not IPv6 capable. Although support for IPv6 will require changes to the DOCSIS protocols, it is expected that the only changes needed to the MIB module itself will be the addition of new compliance statements that mandate support for IPv6 addresses.

### 3.2. Management Requirements

#### 3.2.1. Handling of Software Upgrades

The Cable Modem software upgrade process is documented in [RFI1.0]. From a network management station, the operator

- o sets docsDevSwServer to the address of the Trivial File Transfer Protocol (TFTP) server for software upgrades;
- o sets docsDevSwFilename to the file pathname of the software upgrade image; and
- o sets docsDevSwAdminStatus to upgrade-from-mgt.

Although DOCSIS only specifies the implementation of the TFTP protocol [RFC1350] for file transfers, other functional entities embedded within the cable device (particularly a PacketCable Multimedia Terminal Adapter [MTA-PROV]) specify the optional implementation of the Hyper Text Transfer Protocol (HTTP) [RFC1945] and [RFC2616] for file transfers. The value of the docsDevSwServerTransportProtocol object determines which protocol is used for SNMP-initiated software upgrade.

One reason for the SNMP-initiated upgrade is to allow loading of a temporary software image (e.g., special diagnostic software) that differs from the software normally used on that device without changing the provisioning database.

Note that software upgrades should not be accepted blindly by the cable device. The cable device may refuse an upgrade if

- o the download is incomplete;
- o the file contents are incomplete or damaged; or
- o the software is not intended for that hardware device (this may include the case of a feature set that has not been purchased for this device).

A cable device that implements the code verification mechanisms of [BPIPLUS] verifies the source and integrity of the downloaded image by validating one or more Code Verification Signatures that are bundled within the software upgrade.

### 3.2.2. Events and Notifications

This MIB module provides control facilities for reporting events through syslog [RFC3164], notifications (traps and informs), and non-volatile logging. Additional controls allow the agent to use the SNMP Notification MIB [RFC3413] and Notification Log MIB [RFC3014] for event notification.

The conventions for event reporting are outside the scope of this document. The definition and coding of common DOCSIS notifications can be found in [RFC4547].

### 3.2.3. Notification Throttling

The CM and CMTS MUST provide support for notification message throttling as described below. The network operator can employ notification rate throttling or notification limiting by manipulating the appropriate MIB variables.

#### 3.2.3.1. Notification Rate Throttling

Network operators may employ either of two rate control methods. In the first method, the device ceases to send notifications when the rate exceeds the specified maximum message rate. It resumes sending notifications only if reactivated by a network management station request.

In the second method, the device resumes sending notifications when the rate falls below the specified maximum message rate.

The network operator configures the specified maximum message rate by setting the measurement interval (in seconds), and the maximum number of notifications to be transmitted within the measurement interval. The operator can query the operational throttling state (to determine whether notifications are enabled or blocked by throttling) of the device, as well as query and set the administrative throttling state (to manage the rate control method) of the device.

### 3.2.3.2. Limiting the Notification Rate

Network operators may wish to limit the number of notifications sent by a device over a specified time period. The device ceases to send notifications when the number of notifications exceeds the specified threshold. It resumes sending notifications only when the measurement interval has passed.

The network operator defines the maximum number of notifications he is willing to handle and sets the measurement interval to a large number (in hundredths of a second). For this case, the administrative throttling state is set to stop at a threshold that is the maximum number of notifications.

See "Techniques for Managing Asynchronously Generated Alerts" [RFC1224] for additional technical motivations.

### 3.3. Protocol Filters

The Cable Device MIB provides objects for both Link Layer Control (LLC) and IP protocol filters. The LLC protocol filter entries can be used to limit CM forwarding to a restricted set of network-layer protocols (such as IP, Internetwork Packet Exchange (IPX), Network Basic Input/Output System (NetBIOS), and Appletalk).

The IP protocol filter entries can be used to restrict upstream or downstream traffic according to source and destination IP addresses, transport-layer protocols (such as Transport Control Protocol (TCP), User Datagram Protocol (UDP), and Internet Control Message Protocol (ICMP)), and source and destination TCP/UDP port numbers.

In general, a cable modem applies filters (or, more properly, classifiers) in an order appropriate to the layering model. Specifically, the inbound MAC (or LLC) layer filters are applied first, then the "special" filters, then the IP layer inbound filters, then the IP layer outbound filters, and then any final LLC outbound filters.

```

*****
* LLC Filter In *
*****
  |
  v
*****
* Special Filters *
*   |             *
*   v             *
*   *****      *
*   * IP Spoof *   *
*   *****      *
*   |             *
*   v             *
*   *****      *
*   * SNMP Access * *
*   *****      *
*   |             *
*****
  |
  v
*****
* IP Filter In *
*****
  |
  v
*****
* IP Filter Out *
*****
  |
  v
*****
* LLC Filter Out *
*****

```

### 3.3.1. Inbound LLC Filters: docsDevFilterLLCTable

The inbound LLC (or MAC or level-2) filters are contained in the docsDevFilterLLCTable and are applied to level-2 frames entering the cable modem from either the RF MAC interface or from one of the CPE interfaces (physical or logical). These filters are used to prohibit the processing and forwarding of certain types of level-2 traffic that may be disruptive to the network. The filters, as currently specified, can be set to cause the modem either to drop frames that match at least one filter, or to process a frame that matches at least one filter. Some examples of possible configurations would be to permit only IP (and ARP) traffic, or to drop NetBIOS traffic.

### 3.3.2. Special Filters

Special filters are applied after the packet is accepted from the MAC layer by the IP module, but before any other processing is done. They are filters that apply only to a very specific class of traffic.

#### 3.3.2.1. IP Spoofing Filters: docsDevCpeTable, docsDevCpeInetTable

IP spoofing filters are applied to packets entering the modem from one of the CPE interfaces and are intended to prevent a subscriber from stealing or misusing IP addresses that were not assigned to the subscriber. If the filters are active (enabled), the source address of the IP packet must match at least one IP address in one of these two tables (docsDevCpeTable or docsDevCpeInetTable), or it is discarded without further processing.

To prevent potential implementation ambiguity, the device consults the docsDevCpeTable for the IP packet source address before consulting the docsDevCpeInetTable.

The table can be automatically populated where the first N different IP addresses seen from the CPE side of the cable modem are used to populate the table automatically. The spoofing filters are specified in the docsDevCpeTable and the docsDevCpeInetTable, and the policy for automatically creating filters in those tables is controlled by docsDevCpeEnroll and docsDevMaxCpe, as well as by the network management agent.

Similar IP spoofing filter controls are defined for CMTS implementation in the Subscriber Management MIB [RFC4036].

#### 3.3.2.2. SNMP Access Filters: docsDevNmAccessTable

The SNMP access filters are applied to SNMP packets entering from any interface and destined for the cable modem. If the packets enter from a CPE interface, the SNMP filters are applied after the IP spoofing filters. The filters only apply to SNMPv1 or SNMPv2c traffic and are not consulted for SNMPv3 traffic (and need not be implemented by a v3-only agent). SNMPv3 access control is specified in the User Security Model MIB, in [RFC3414].

With the completion of the SNMP coexistence document, RFC 3584 [RFC3584], docsDevNmAccess table has been deprecated in this version of the MIB. See the body of the MIB for the description of how agents should handle the interaction between RFC 3584 MIBs and this MIB.

### 3.3.3. IP Filtering: docsDevFilterIpTable

The IP Filtering table acts as a classifier table. Each row in the table describes a template against which IP packets are compared. The template includes source and destination addresses (and their associated masks), upper level protocol (e.g., TCP, UDP), source and destination port ranges, and Terms of Service (ToS) values. A row also contains interface and traffic direction match values that have to be considered in combination. All columns of a particular row must match the appropriate fields in the packet and must match the interface and direction items for the packet to result in a match to the packet.

When classifying a packet, each table is scanned, beginning with the lowest number filter. If the agent finds a match, it applies the group of policies specified. If the matched filter has the continue bit set, the agent continues the scan possibly matching additional filters and applying additional policies. For example, this allows the agent to take one set of actions for the 24.0.16/255.255.0 group and one set of actions for telnet packets to/from 24.0.16.30, and these sets of actions may not be mutually exclusive.

Once a packet is matched, one of three actions happen according to the setting of docsDevFilterIpControl in the row. The packet may be dropped, in which case no further processing is required. The packet may be accepted, and processing of the packet continues. Lastly, the packet may have a set of policy actions applied to it. If docsDevFilterIpContinue is set to true, scanning of the table continues and additional matches may result.

When a packet matches and docsDevFilterIpControl in the filter matched is set to 'policy', the value of docsDevFilterIpPolicyId is used as a selector into the docsDevFilterPolicyTable. The first level of indirection may result in zero or more actions being taken according to the match. The docsDevFilterPolicyTable is scanned in row order, and all rows where docsDevFilterPolicyId equals docsDevFilterIpPolicyId have the action specified by the docsDevFilterPolicyValue 'executed'.

For an example of the use of these IP Filtering MIB tables, see [RFC2669].

The IP Filtering table and related tables have been deprecated in this version of the MIB in favor of the Data Path, Classifier, and Action tables from the Differentiated Services MIB [RFC3289]. See the body of the MIB for the description of how agents should handle the interaction between RFC 3289 MIBs and this MIB module.

### 3.3.4. Outbound LLC Filters

Lastly, any outbound LLC filters are applied to the packet just prior to its being emitted on the appropriate interface. This MIB module does not specify any outbound LLC filters, but section 3 of the DOCSIS Quality of Service (QoS) MIB, [RFC4323], includes outbound LLC filtering requirements.

## 4. Definitions

DOCS-CABLE-DEVICE-MIB DEFINITIONS ::= BEGIN

IMPORTS

```

    MODULE-IDENTITY,
    OBJECT-TYPE,
    IpAddress,
    Unsigned32,
    Counter32,
    Integer32,
    zeroDotZero,
    mib-2
        FROM SNMPv2-SMI                -- RFC 2578
    RowStatus,
    RowPointer,
    DateAndTime,
    TruthValue,
    StorageType
        FROM SNMPv2-TC                -- RFC 2579
    InetAddressType,
    InetAddress
        FROM INET-ADDRESS-MIB         -- RFC 4001
    OBJECT-GROUP,
    MODULE-COMPLIANCE
        FROM SNMPv2-CONF              -- RFC 2580
    SnmpAdminString
        FROM SNMP-FRAMEWORK-MIB       -- RFC 3411
    InterfaceIndexOrZero
        FROM IF-MIB                   -- RFC 2863
    ZeroBasedCounter32
        FROM RMON2-MIB                -- RFC 4502
    diffServMIBDataPathGroup,
    diffServMIBClfrGroup,
    diffServMIBClfrElementGroup,
    diffServMIBMultiFieldClfrGroup,
    diffServMIBActionGroup,
    diffServMIBDscpMarkActGroup,
    diffServMIBCounterGroup,
    diffServMIBAlgDropGroup,
```

```

diffServDataPathStatus,
diffServClfrStatus,
diffServClfrElementStatus,
diffServMultiFieldClfrAddrType,
diffServMultiFieldClfrSrcAddr,
diffServMultiFieldClfrDstAddr,
diffServAlgDropStatus,
diffServDataPathStorage,
diffServClfrStorage,
diffServClfrElementStorage,
diffServMultiFieldClfrStorage,
diffServActionStorage,
diffServCountActStorage,
diffServAlgDropStorage,
diffServAlgDropType
    FROM DIFFSERV-MIB;          -- RFC 3289

```

## docsDev MODULE-IDENTITY

```

LAST-UPDATED  "200612200000Z" -- December 20, 2006
ORGANIZATION  "IETF IP over Cable Data Network
               Working Group"

```

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```

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```

## DESCRIPTION

```

      "This is the MIB Module for DOCSIS-compliant cable modems

```

and cable-modem termination systems.

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REVISION "200612200000Z" -- December 20, 2006

DESCRIPTION

"Second version, published as RFC 4639.

Modifications to this MIB module since RFC 2669 include:

- Deprecation of the docsDevFilter group in favor of the DiffServ MIB groups, to enable support for IPv6 filtering and DiffServ Code Point (DSCP) marking.
- Deprecation of the docsDevCpeGroup in favor of the docsDevCpeInetGroup, to enable support of IPv6.
- Addition of various InetAddress objects to enable support of IPv6.
- Deprecation of docsDevNmAccessTable in favor of SNMP Coexistence and SNMPv3 -- yet adding docsDevNmAccessTrapVersion and clarifying docsDevNmAccessIp for current use of this table,
- Addition of docsDevIgmpModeControl for management and control of the IGMP mode of operation,
- Addition of docsDevMaxCpe for management of the maximum number of CPEs permitted access through a cable modem,
- Addition of docsDevSwServerTransportProtocol, and modifications to docsDevSoftware object DESCRIPTIONS, to enable software downloads via either TFTP or HTTP,
- Replacement of docsDevEvThrottleInhibited with docsDevEvThrottleThresholdExceeded to simplify event threshold management,
- Modification of docsDevEvReporting to enable local logging to the internal volatile log, and not to the internal non-volatile log,
- Modification of the compliance statement to make the docsDevCpe objects optional
- Created placeholders for two OIDs in the docsDevFilterPolicyTable that were never used
- Modified the DESCRIPTION of docsDevSwServerTransportProtocol and docsDevSwServerAddressType to address the dependence between each object
- Added a reference to docsDevServerConfigTftpAddress
- Clarified the scope of notifications that are covered by docsDevEvThrottleThreshold
- Clarified an error condition that could occur when

- doing a SET to docsDevEvReporting
- Defined each of the enumerated types for both docsDevEvLevel and docsDevEvPriority
- Added UNITS clause to docsDevFilterLLCMatches, docsDevFilterIpMatches, docsDevMaxCpe, docsDevEvThrottleThreshold and docsDevEvCounts.
- Added REFERENCE clause to docsDevFilterIpProtocol
- Modified DESCRIPTION of docsDevCpeInetAddr to be more protocol-neutral
- Removed the enumerated value (1) from both docsDevCpeInetSource and docsDevCpeSource
- Covered additional read-write and read-create objects in the Security Considerations section
- Modified the default value of docsDevNmAccessIpMask to be consistent with OSSI specification
- Modified the SYNTAX of docsDevNmAccessCommunity and docsDevNmAccessInterfaces in the Conformance Statement section
- Added SYNTAX clause to docsDevEvReporting in the Conformance Statement section
- Modified SYNTAX clause of docsDevEvReporting to move new enumerated type to byte boundary
- Added references to DOCSIS 2.0 specifications to multiple objects
- Clarified non-persistency across reboots for all tables
- Clarified functionality of docsDevSw objects as they relate to docsDevSwOperStatus
- Clarified enumerated types (9) and (10) for docsDevServerBootState
- Defined the state of unknown(0) for the following objects: docsDevServerDhcpAddressType, docsDevServerTimeAddressType, docsDevServerConfigTftpAddressType and docsDevServerConfigTftpAddressType
- Modified the value in docsDevFilterIpDaddr to be consistent with the SYNTAX
- Specified which rows could be modified in an active row for docsDevFilterPolicyStatus
- Defined the term 'manually' in docsDevCpeEnroll
- Clarified the description for docsDevFilterTosOrMask
- Covered the case of a non-existent row for docsDevFilterPolicyPtr
- Added DEFVAL clauses for multiple objects
- Replaced docsDevNotification OBJECT IDENTIFIER with docsDevNotifications to address possible compatibility issues

- Added support for the usage of RFC 3413 and RFC 3014 as event notification mechanisms
- Removed docsDevFilterPolicyObsoleteGroup
- Added stdInterface(9) type to docsDevEvReporting to support the usage of RFC3413 and RFC3014
- Modified DESCRIPTION for docsDevMaxCpe"

REVISION "199908190000Z"

DESCRIPTION

"Initial version, published as RFC 2669."

::= { mib-2 69 }

docsDevMIBObjects OBJECT IDENTIFIER ::= { docsDev 1 }

docsDevBase OBJECT IDENTIFIER ::= { docsDevMIBObjects 1 }

--

-- For the following object, there is no concept in the  
 -- RFI specification corresponding to a backup CMTS. The  
 -- enumeration is provided here in case someone is able  
 -- to define such a role or device.

--

docsDevRole OBJECT-TYPE

SYNTAX INTEGER {

cm(1),

cmtsActive(2),

cmtsBackup(3)

}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Defines the current role of this device. cm(1) is a Cable Modem, cmtsActive(2) is a Cable Modem Termination System that is controlling the system of cable modems, and cmtsBackup(3) is a CMTS that is currently connected but is not controlling the system (not currently used).

In general, if this device is a 'cm', its role will not change during operation or between reboots. If the device is a 'cmts' it may change between cmtsActive and cmtsBackup and back again during normal operation. NB: At this time, the DOCSIS standards do not support the concept of a backup CMTS, but cmtsBackup is included for completeness."

::= { docsDevBase 1 }

## docsDevDateTime OBJECT-TYPE

SYNTAX DateAndTime

MAX-ACCESS read-write

STATUS current

## DESCRIPTION

"The current date and time, with time zone information (if known)."

If the real data and time cannot be determined, this shall represent elapsed time from boot relative to the standard epoch '1970-1-1,0:0:0.0'. In other words, if this agent has been up for 3 minutes and not been able to determine what the actual date and time are, this object will return the value '1970-1-1,0:03:0.0'."

::= { docsDevBase 2 }

## docsDevResetNow OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

## DESCRIPTION

"Setting this object to true(1) causes the device to reset. Reading this object always returns false(2)."

::= { docsDevBase 3 }

## docsDevSerialNumber OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"The manufacturer's serial number for this device."

::= { docsDevBase 4 }

## docsDevSTPControl OBJECT-TYPE

SYNTAX INTEGER {  
    stEnabled(1),  
    noStFilterBpdu(2),  
    noStPassBpdu(3)  
}

MAX-ACCESS read-write

STATUS current

## DESCRIPTION

"This object controls operation of the spanning tree protocol (as distinguished from transparent bridging)."

If set to stEnabled(1), then the spanning tree protocol is enabled, subject to bridging constraints.

If noStFilterBpdu(2), then spanning tree is not active, and Bridge PDUs received are discarded.

If noStPassBpdu(3), then spanning tree is not active, and Bridge PDUs are transparently forwarded.

Note that a device need not implement all of these options, but that noStFilterBpdu(2) is required."

```
DEFVAL { noStFilterBpdu }  
::= { docsDevBase 5 }
```

#### docsDevIgmpModeControl OBJECT-TYPE

```
SYNTAX INTEGER {  
    passive(1),  
    active(2)  
}  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION
```

"This object controls the IGMP mode of operation for the CM or CMTS. In passive mode, the device forwards IGMP between interfaces as based on knowledge of Multicast Session activity on the subscriber side interface and the rules defined in the DOCSIS RFI specification. In active mode, the device terminates at and initiates IGMP through its interfaces as based on the knowledge of Multicast Session activity on the subscriber side interface."

#### REFERENCE

"DOCSIS RFI 1.1 Specification, Section 3.3.1. and  
DOCSIS RFI 2.0 Specification, Section 5.3.1."

```
DEFVAL { passive }  
::= { docsDevBase 6 }
```

#### docsDevMaxCpe OBJECT-TYPE

```
SYNTAX Unsigned32 (0..255)  
UNITS "CPEs"  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION
```

"The maximum number of CPEs that can be granted access through a CM during a CM epoch. This value can be obtained from the CM configuration file; however, it may be adjusted by the CM according to hardware or software limitations that have been imposed on the implementation."

#### REFERENCE

"DOCSIS RFI 1.0 Specification, Appendix C.7.20., and

DOCSIS RFI 1.1 Specification, Appendix C.1.1.7. and  
DOCSIS RFI 2.0 Specification, Appendix C.1.1.7."  
 ::= { docsDevBase 7 }

--  
-- The following table provides one level of security for access  
-- to the device by network management stations.  
-- Note that access is also constrained by the  
-- community strings and any vendor-specific security.  
--

docsDevNmAccessTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsDevNmAccessEntry

MAX-ACCESS not-accessible

STATUS deprecated

DESCRIPTION

"This table controls access to SNMP objects by network management stations. If the table is empty, access to SNMP objects is unrestricted. The objects in this table MUST NOT persist across reboots. The objects in this table are only accessible from cable devices that are not capable of operating in SNMP Coexistence mode (RFC 3584) or in SNMPv3 mode (RFC 3410). See the conformance section for details. Note that some devices are required by other specifications (e.g., the DOCSIS OSSiv1.1 specification) to support the legacy SNMPv1/v2c docsDevNmAccess mode for backward compatibility.

This table is deprecated. Instead, use the SNMP coexistence MIBs from RFC 3584, the TARGET and NOTIFICATION MIBs from RFC 3413, and the View-Based Access Control Model (VACM) MIBs for all SNMP protocol versions from RFC 3415."

::= { docsDevMIBObjects 2 }

docsDevNmAccessEntry OBJECT-TYPE

SYNTAX DocsDevNmAccessEntry

MAX-ACCESS not-accessible

STATUS deprecated

DESCRIPTION

"An entry describing access to SNMP objects by a particular network management station. An entry in this table is not readable unless the management station has read-write permission (either implicit if the table is empty, or explicit through an entry in this table). Entries are ordered by docsDevNmAccessIndex. The first

matching entry (e.g., matching IP address and community string) is used to derive access."

```
INDEX { docsDevNmAccessIndex }
 ::= { docsDevNmAccessTable 1 }
```

```
DocsDevNmAccessEntry ::= SEQUENCE {
    docsDevNmAccessIndex      Integer32,
    docsDevNmAccessIp         IpAddress,
    docsDevNmAccessIpMask     IpAddress,
    docsDevNmAccessCommunity  OCTET STRING,
    docsDevNmAccessControl    INTEGER,
    docsDevNmAccessInterfaces OCTET STRING,
    docsDevNmAccessStatus     RowStatus,
    docsDevNmAccessTrapVersion INTEGER
}
```

```
docsDevNmAccessIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS  not-accessible
    STATUS      deprecated
    DESCRIPTION
        "Index used to order the application of access
         entries."
    ::= { docsDevNmAccessEntry 1 }
```

```
docsDevNmAccessIp OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "The IP address (or subnet) of the network management
         station. The address 0.0.0.0 is defined to mean
         any Network Management Station (NMS). If traps are
         enabled for this entry, then the value must be the
         address of a specific device. Implementations MAY
         recognize 255.255.255.255 as equivalent to 0.0.0.0."
    DEFVAL { '00000000'h }
    ::= { docsDevNmAccessEntry 2 }
```

```
docsDevNmAccessIpMask OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "The IP subnet mask of the network management stations.
         If traps are enabled for this entry, then the value must
         be 0.0.0.0. Implementations MAY recognize
         255.255.255.255 as equivalent to 0.0.0.0."
```

```
DEFVAL { '00000000'h }
::= { docsDevNmAccessEntry 3 }
```

```
docsDevNmAccessCommunity OBJECT-TYPE
```

```
SYNTAX      OCTET STRING
```

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

```
STATUS      deprecated
```

```
DESCRIPTION
```

```
    "The community string to be matched for access by this
    entry.  If set to a zero-length string, then any
    community string will match.  When read, this object
    SHOULD return a zero-length string."
```

```
DEFVAL { "public" }
```

```
::= { docsDevNmAccessEntry 4 }
```

```
docsDevNmAccessControl OBJECT-TYPE
```

```
SYNTAX      INTEGER {
```

```
    none(1),
```

```
    read(2),
```

```
    readWrite(3),
```

```
    roWithTraps(4),
```

```
    rwWithTraps(5),
```

```
    trapsOnly(6)
```

```
}
```

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

```
STATUS      deprecated
```

```
DESCRIPTION
```

```
    "Specifies the type of access allowed to this NMS.
    Setting this object to none(1) causes the table entry
    to be destroyed.  Read(2) allows access by 'get' and
    'get-next' PDUs.  ReadWrite(3) allows access by 'set' as
    well.  RoWithtraps(4), rwWithTraps(5), and trapsOnly(6)
    control distribution of Trap PDUs transmitted by this
    device."
```

```
DEFVAL { read }
```

```
::= { docsDevNmAccessEntry 5 }
```

```
-- The syntax of the following object was copied from RFC 1493,
-- dot1dStaticAllowedToGoTo.
```

```
docsDevNmAccessInterfaces OBJECT-TYPE
```

```
SYNTAX      OCTET STRING (SIZE (1..32))
```

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

```
STATUS      deprecated
```

```
DESCRIPTION
```

```
    "Specifies the set of interfaces from which requests from
    this NMS will be accepted.  Each octet within
    the value of this object specifies a set of eight
```

interfaces, the first octet specifying ports 1 through 8, the second octet specifying interfaces 9 through 16, etc. Within each octet, the most significant bit represents the lowest numbered interface, and the least significant bit represents the highest numbered interface. Thus, each interface is represented by a single bit within the value of this object. If that bit has a value of '1' then that interface is included in the set.

Note that entries in this table apply only to link-layer interfaces (e.g., Ethernet and CATV MAC). Bits representing upstream and downstream channel interfaces MUST NOT be set to '1'.

Note that if bits corresponding to non-existing interfaces are set, the result is implementation specific.

Note that according to the DOCSIS OSSiv1.1 specification, when ifIndex '1' is included in the set, then this row applies to all CPE (customer-facing) interfaces.

The size of this object is the minimum required to represent all configured interfaces for this device."

```
::= { docsDevNmAccessEntry 6 }
```

docsDevNmAccessStatus OBJECT-TYPE

```
SYNTAX      RowStatus
MAX-ACCESS  read-create
STATUS      deprecated
DESCRIPTION
```

"Controls and reflects the status of rows in this table. Rows in this table may be created by either the create-and-go or create-and-wait paradigm. There is no restriction on changing values in a row of this table while the row is active.

The following objects MUST have valid values before this object can be set to active: docsDevNmAccessIp, docsDevNmAccessStatus, docsDevNmAccessIpMask, docsDevNmAccessCommunity, docsDevNmAccessControl, and docsDevNmAccessInterfaces."

```
::= { docsDevNmAccessEntry 7 }
```

docsDevNmAccessTrapVersion OBJECT-TYPE

```
SYNTAX      INTEGER {
```

```

        disableSNMPv2trap(1),
        enableSNMPv2trap(2)
    }
MAX-ACCESS    read-create
STATUS        deprecated
DESCRIPTION
    "Specifies the TRAP version that is sent to this NMS.
    Setting this object to disableSNMPv2trap (1) causes the
    trap in SNMPv1 format to be sent to a particular NMS.
    Setting this object to enableSNMPv2trap (2) causes the
    trap in SNMPv2 format be sent to a particular NMS."
DEFVAL { disableSNMPv2trap }
::= { docsDevNmAccessEntry 8 }

--
-- The following group describes control objects used for downloading
-- firmware to a cable device. Procedures for software download are
-- described in Section 3.2.1 of the RFC containing this MIB module.
--

docsDevSoftware OBJECT IDENTIFIER ::= { docsDevMIBObjects 3 }

docsDevSwServer OBJECT-TYPE
    SYNTAX      IPAddress
    MAX-ACCESS   read-write
    STATUS      deprecated
    DESCRIPTION
        "The address of the TFTP server used for software
        upgrades. If the TFTP server is unknown or is a
        non-IPv4 address, return 0.0.0.0.

        This object is deprecated. See docsDevSwServerAddress
        for its replacement. This object will have its value
        modified, given a valid SET to docsDevSwServerAddress."
    ::= { docsDevSoftware 1 }

docsDevSwFilename OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE (0..64))
    MAX-ACCESS   read-write
    STATUS      current
    DESCRIPTION
        "The filename of the software image to be downloaded via
        TFTP, or the abs_path (as defined in RFC 2616) of the
        software image to be downloaded via HTTP.

        Unless set via SNMP, this is the filename or abs_path
        specified by the provisioning server during the boot
        process that corresponds to the software version that

```

is desired for this device.

If unknown, the value of this object is the zero-length string."

```
::= { docsDevSoftware 2 }
```

docsDevSwAdminStatus OBJECT-TYPE

```
SYNTAX INTEGER {  
    upgradeFromMgt(1),  
    allowProvisioningUpgrade(2),  
    ignoreProvisioningUpgrade(3)  
}
```

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"If set to upgradeFromMgt(1), the device will initiate a TFTP or HTTP software image download. After successfully receiving an image, the device will set its state to ignoreProvisioningUpgrade(3) and reboot. If the download process is interrupted (e.g., by a reset or power failure), the device will load the previous image and, after re-initialization, continue to attempt loading the image specified in docsDevSwFilename.

If set to allowProvisioningUpgrade(2), the device will use the software version information supplied by the provisioning server when next rebooting (this does not cause a reboot).

When set to ignoreProvisioningUpgrade(3), the device will disregard software image upgrade information from the provisioning server.

Note that reading this object can return upgradeFromMgt(1). This indicates that a software download is currently in progress, and that the device will reboot after successfully receiving an image."

```
DEFVAL { allowProvisioningUpgrade }
```

```
::= { docsDevSoftware 3 }
```

docsDevSwOperStatus OBJECT-TYPE

```
SYNTAX INTEGER {  
    inProgress(1),  
    completeFromProvisioning(2),  
    completeFromMgt(3),  
    failed(4),  
    other(5)  
}
```

MAX-ACCESS read-only  
 STATUS current  
 DESCRIPTION

"InProgress(1) indicates that a TFTP or HTTP download is underway, either as a result of a version mismatch at provisioning or as a result of a upgradeFromMgt request. No other docsDevSw\* objects can be modified in this state.

CompleteFromProvisioning(2) indicates that the last software upgrade was a result of version mismatch at provisioning.

CompleteFromMgt(3) indicates that the last software upgrade was a result of setting docsDevSwAdminStatus to upgradeFromMgt.

Failed(4) indicates that the last attempted download failed, ordinarily due to TFTP or HTTP timeout."

REFERENCE

"DOCSIS RFI 1.0 Specification, Section 8.2., and  
 DOCSIS RFI 1.1 Specification, Section 10.1. and  
 DOCSIS RFI 2.0 Specification, Section 12.1."

::= { docsDevSoftware 4 }

docsDevSwCurrentVers OBJECT-TYPE

SYNTAX SnmpAdminString  
 MAX-ACCESS read-only  
 STATUS current  
 DESCRIPTION

"The software version currently operating in this device. This string's syntax is that used by the individual vendor to identify software versions. For a CM, this string will describe the current software load. For a CMTS, this object SHOULD contain a human-readable representation either of the vendor specific designation of the software for the chassis, or of the software for the control processor. If neither of these is applicable, the value MUST be a zero-length string."

::= { docsDevSoftware 5 }

docsDevSwServerAddressType OBJECT-TYPE

SYNTAX InetAddressType  
 MAX-ACCESS read-write  
 STATUS current  
 DESCRIPTION

"The type of address of the TFTP or HTTP server used for

software upgrades.

If docsDevSwServerTransportProtocol is currently set to tftp(1), attempting to set this object to dns(16) MUST result in an error."

::= { docsDevSoftware 6 }

docsDevSwServerAddress OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The address of the TFTP or HTTP server used for software upgrades.

If the TFTP/HTTP server is unknown, return the zero-length address string (see the TextualConvention).

If docsDevSwServer is also implemented in this agent, this object is tied to it. A set of this object to an IPv4 address will result in also setting the value of docsDevSwServer to that address. If this object is set to an IPv6 address, docsDevSwServer is set to 0.0.0.0. If docsDevSwServer is set, this object is also set to that value. Note that if both are set in the same action, the order of which one sets the other is undefined."

::= { docsDevSoftware 7 }

docsDevSwServerTransportProtocol OBJECT-TYPE

SYNTAX INTEGER {

tftp(1),

http(2)

}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object specifies the transport protocol (TFTP or HTTP) to be used for software upgrades.

If the value of this object is tftp(1), then the cable device uses TFTP (RFC 1350) read request packets to download the docsDevSwFilename from the docsDevSwServerAddress in octet mode.

If the value of this object is http(2), then the cable device uses HTTP 1.0 (RFC 1945) or HTTP 1.1 (RFC 2616) GET requests sent to host docsDevSwServerAddress to

download the software image from path docsDevSwFilename.

If docsDevSwServerAddressType is currently set to dns(16), attempting to set this object to tftp(1) MUST result in an error."

DEFVAL { tftp }

::= { docsDevSoftware 8 }

--

-- The following group describes server access and parameters used  
-- for initial provisioning and bootstrapping.

--

docsDevServer OBJECT IDENTIFIER ::= { docsDevMIBObjects 4 }

docsDevServerBootState OBJECT-TYPE

SYNTAX INTEGER {  
operational(1),  
disabled(2),  
waitingForDhcpOffer(3),  
waitingForDhcpResponse(4),  
waitingForTimeServer(5),  
waitingForTftp(6),  
refusedByCmts(7),  
forwardingDenied(8),  
other(9),  
unknown(10)  
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"If operational(1), the device has completed loading and processing of configuration parameters, and the CMTS has completed the Registration exchange.

If disabled(2), then the device was administratively disabled, possibly by being refused network access in the configuration file.

If waitingForDhcpOffer(3), then a Dynamic Host Configuration Protocol (DHCP) Discover has been transmitted, and no offer has yet been received.

If waitingForDhcpResponse(4), then a DHCP Request has been transmitted, and no response has yet been received.

If waitingForTimeServer(5), then a Time Request has been transmitted, and no response has yet been received.

If waitingForTftp(6), then a request to the TFTP parameter server has been made, and no response received.

If refusedByCmts(7), then the Registration Request/Response exchange with the CMTS failed.

If forwardingDenied(8), then the registration process was completed, but the network access option in the received configuration file prohibits forwarding.

If other(9), then the registration process reached a point that does not fall into one of the above categories.

If unknown(10), then the device has not yet begun the registration process or is in some other indeterminate state."

#### REFERENCE

"DOCSIS RFI 1.0 Specification, Figure 7-1, and  
DOCSIS RFI 1.1 Specification, Figure 9-1 and  
DOCSIS RFI 2.0 Specification, Figure 11-1."

```
::= { docsDevServer 1 }
```

#### docsDevServerDhcp OBJECT-TYPE

```
SYNTAX      IPAddress
MAX-ACCESS  read-only
STATUS      deprecated
```

#### DESCRIPTION

"The IP address of the DHCP server that assigned an IP address to this device. Returns 0.0.0.0 if DHCP is not used for IP address assignment, or if this agent is not assigned an IPv4 address.

This object is deprecated and is replaced by docsDevServerDhcpAddress."

```
::= { docsDevServer 2 }
```

#### docsDevServerTime OBJECT-TYPE

```
SYNTAX      IPAddress
MAX-ACCESS  read-only
STATUS      deprecated
```

#### DESCRIPTION

"The IP address of the Time server (RFC 0868). Returns 0.0.0.0 if the time server IP address is unknown, or if the time server is not an IPv4 server.

This object is deprecated and is replaced by

```
        docsDevServerTimeAddress."
 ::= { docsDevServer 3 }

docsDevServerTftp OBJECT-TYPE
    SYNTAX      IPAddress
    MAX-ACCESS  read-only
    STATUS      deprecated
    DESCRIPTION
        "The IP address of the TFTP server responsible for
        downloading provisioning and configuration parameters
        to this device. Returns 0.0.0.0 if the TFTP server
        address is unknown or is not an IPv4 address.

        This object is deprecated and is replaced by
        docsDevServerConfigTftpAddress."
 ::= { docsDevServer 4 }

docsDevServerConfigFile OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The name of the device configuration file read from
        the TFTP server. Returns a zero-length string if
        the configuration file name is unknown."
 ::= { docsDevServer 5 }

docsDevServerDhcpAddressType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The type of address of docsDevServerDhcpAddress. If
        DHCP was not used, this value should return
        unknown(0)."
 ::= { docsDevServer 6 }

docsDevServerDhcpAddress OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The internet address of the DHCP server that assigned
        an IP address to this device. Returns the zero length
        octet string if DHCP was not used for IP address
        assignment."
 ::= { docsDevServer 7 }
```

## docsDevServerTimeAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"The type of address of docsDevServerTimeAddress. If no time server exists, this value should return unknown(0)."

::= { docsDevServer 8 }

## docsDevServerTimeAddress OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"The Internet address of the RFC 868 Time server, as provided by DHCP option 4.

Note that if multiple values are provided to the CM in DHCP option 4, the value of this MIB object MUST be the Time server address from which the Time of Day reference was acquired as based on the DOCSIS RFI specification. During the period of time where the Time of Day have not been acquired, the Time server address reported by the CM may report the first address value in the DHCP option value or the last server address the CM attempted to get the Time of day value.

Returns the zero-length octet string if the time server IP address is not provisioned."

## REFERENCE

"DOCSIS RFI 1.1 Specification, Section 9.2.7. and DOCSIS RFI 2.0 Specification, Section 11.2.7."

::= { docsDevServer 9 }

## docsDevServerConfigTftpAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

## DESCRIPTION

"The type of address of docsDevServerConfigTftpAddress. If no TFTP server exists, this value should return unknown(0)."

::= { docsDevServer 10 }

## docsDevServerConfigTftpAddress OBJECT-TYPE

SYNTAX InetAddress

```

MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "The internet address of the TFTP server responsible for
    downloading provisioning and configuration parameters
    to this device. Returns the zero-length octet string if
    the config server address is unknown. There are certain
    security risks that are involved with using TFTP."
REFERENCE
    "RFC 3617, Section 5"
::= { docsDevServer 11 }

```

```

--
-- Event Reporting
--

```

```
docsDevEvent OBJECT IDENTIFIER ::= { docsDevMIBObjects 5 }
```

```

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

```

```

docsDevEvSyslog OBJECT-TYPE
    SYNTAX        IpAddress
    MAX-ACCESS    read-write
    STATUS        deprecated
    DESCRIPTION
        "The IP address of the Syslog server. If 0.0.0.0, either
        syslog transmission is inhibited, or the Syslog server
        address is not an IPv4 address.

        This object is deprecated and is replaced by
        docsDevEvSyslogAddress."
    ::= { docsDevEvent 2 }

```

```
docsDevEvThrottleAdminStatus OBJECT-TYPE
```

```

SYNTAX INTEGER {
    unconstrained(1),
    maintainBelowThreshold(2),
    stopAtThreshold(3),
    inhibited(4)
}
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION
    "Controls the transmission of traps and syslog messages
    with respect to the trap pacing threshold.

    unconstrained(1) causes traps and syslog messages to be
    transmitted without regard to the threshold settings.

    maintainBelowThreshold(2) causes trap transmission and
    syslog messages to be suppressed if the number of traps
    would otherwise exceed the threshold.

    stopAtThreshold(3) causes trap transmission to cease at
    the threshold and not to resume until directed to do so.

    inhibited(4) causes all trap transmission and syslog
    messages to be suppressed.

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

    Writing to this object resets the thresholding state."
DEFVAL { unconstrained }
::= { docsDevEvent 3 }

```

docsDevEvThrottleInhibited OBJECT-TYPE

```

SYNTAX        TruthValue
MAX-ACCESS    read-only
STATUS        deprecated
DESCRIPTION
    "If true(1), trap and syslog transmission is currently
    inhibited due to thresholds and/or the current setting
    of docsDevEvThrottleAdminStatus.  In addition, this is
    true(1) when transmission is inhibited because no
    syslog (docsDevEvSyslog) or trap (docsDevNmAccessEntry)
    destinations have been set.

    This object is deprecated and is replaced by
    docsDevEvThrottleThresholdExceeded."

```

```
::= { docsDevEvent 4 }
```

```
docsDevEvThrottleThreshold OBJECT-TYPE
```

```
SYNTAX      Unsigned32
```

```
UNITS       "events"
```

```
MAX-ACCESS  read-write
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "Number of events per docsDevEvThrottleInterval permitted
    before throttling is to occur."
```

```
    A single event, whether the notification could result in
    messages transmitted using syslog, SNMP, or both
    protocols, and regardless of the number of destinations,
    (including zero) is always treated as a single event for
    threshold counting. For example, an event causing both
    a trap and a syslog message is still treated as a single
    event.
```

```
    All system notifications that occur within the device
    should be taken into consideration when calculating
    and monitoring the threshold."
```

```
DEFVAL { 0 }
```

```
::= { docsDevEvent 5 }
```

```
docsDevEvThrottleInterval OBJECT-TYPE
```

```
SYNTAX      Integer32 (1..2147483647)
```

```
UNITS       "seconds"
```

```
MAX-ACCESS  read-write
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The interval over which docsDevEvThrottleThreshold
    applies."
```

```
DEFVAL { 1 }
```

```
::= { docsDevEvent 6 }
```

```
--
```

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

```
--
```

```
docsDevEvControlTable OBJECT-TYPE
```

```
SYNTAX      SEQUENCE OF DocsDevEvControlEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "This table allows control of the reporting of event
    classes. For each event priority, a combination of
```

logging and reporting mechanisms may be chosen. The mapping of event types to priorities is vendor dependent. Vendors may also choose to allow the user to control that mapping through proprietary means. Table entries MUST persist across reboots for CMTS devices and MUST NOT persist across reboots for CM devices."

```
::= { docsDevEvent 7 }
```

docsDevEvControlEntry OBJECT-TYPE

SYNTAX DocsDevEvControlEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Allows configuration of the reporting mechanisms for a particular event priority."

INDEX { docsDevEvPriority }

```
::= { docsDevEvControlTable 1 }
```

DocsDevEvControlEntry ::= SEQUENCE {

docsDevEvPriority INTEGER,

docsDevEvReporting BITS

}

docsDevEvPriority OBJECT-TYPE

SYNTAX INTEGER {

emergency(1),

alert(2),

critical(3),

error(4),

warning(5),

notice(6),

information(7),

debug(8)

}

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The priority level that is controlled by this entry. These are ordered from most (emergency) to least (debug) critical. Each event with a CM or CMTS has a particular priority level associated with it (as defined by the vendor).

emergency(1) events indicate vendor-specific fatal hardware or software errors that prevent normal system operation.

alert(2) events indicate a serious failure that causes the reporting system to reboot but is not caused by hardware or software malfunctioning.

critical(3) events indicate a serious failure that requires attention and prevents the device from transmitting data but that could be recovered without rebooting the system.

error(4) and warning(5) events indicate that a failure occurred that could interrupt the normal data flow but that does not cause the device to re-register.

notice(6) and information(7) events indicate a milestone or checkpoint in normal operation that could be of particular importance for troubleshooting.

debug(8) events are reserved for vendor-specific events.

During normal operation, no event more critical than notice(6) should be generated. Events between warning and emergency should be generated at appropriate levels of problems (e.g., emergency when the box is about to crash)."

```
::= { docsDevEvControlEntry 1 }
```

docsDevEvReporting OBJECT-TYPE

```
SYNTAX BITS {
    local(0),
    traps(1),
    syslog(2),
    -- The following are extensions to the original set of
    -- labels. The extensions start at an octet boundary.
    -- So for bits 3 - 7, one MUST set them to zero on send
    -- and one MUST ignore them on receipt.
    localVolatile(8),
    stdInterface(9)
}
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION
```

"Defines the action to be taken on occurrence of this event class. Implementations may not necessarily support all options for all event classes but at minimum must allow traps and syslogging to be disabled.

If the local(0) bit is set, then log to the internal log and update non-volatile store, for backward compatibility with the original RFC 2669 definition. If the traps(1) bit is set, then generate an SNMP trap; if the syslog(2) bit is set, then send a syslog message (assuming that the syslog address is set). If the localVolatile(8) bit is set, then log to the internal log without updating non-volatile store. If the stdInterface(9) bit is set, then the agent ignores all other bits except the local(0), syslog(2), and localVolatile(8) bits. Setting the stdInterface(9) bit indicates that RFC3413 and RFC3014 are being used to control event reporting mechanisms."

```
::= { docsDevEvControlEntry 2 }
```

docsDevEventTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsDevEventEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Contains a log of network and device events that may be of interest in fault isolation and troubleshooting. If the local(0) bit is set in docsDevEvReporting, entries in this table MUST persist across reboots."

```
::= { docsDevEvent 8 }
```

docsDevEventEntry OBJECT-TYPE

SYNTAX DocsDevEventEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Describes a network or device event that may be of interest in fault isolation and troubleshooting. Multiple sequential identical events are represented by incrementing docsDevEvCounts and setting docsDevEvLastTime to the current time rather than creating multiple rows.

Entries are created with the first occurrence of an event. docsDevEvControl can be used to clear the table. Individual events cannot be deleted."

INDEX { docsDevEvIndex }

```
::= { docsDevEventTable 1 }
```

DocsDevEventEntry ::= SEQUENCE {

docsDevEvIndex Integer32,

docsDevEvFirstTime DateAndTime,

```

        docsDevEvLastTime      DateAndTime,
        docsDevEvCounts        Counter32,
        docsDevEvLevel         INTEGER,
        docsDevEvId            Unsigned32,
        docsDevEvText          SnmpAdminString
    }

docsDevEvIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "Provides relative ordering of the objects in the event
        log. This object will always increase except when
        (a) the log is reset via docsDevEvControl,
        (b) the device reboots and does not implement
        non-volatile storage for this log, or (c) it reaches
        the value 2^31. The next entry for all the above
        cases is 1."
    ::= { docsDevEventEntry 1 }

docsDevEvFirstTime OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The value of docsDevDateTime at the time this entry was
        created."
    ::= { docsDevEventEntry 2 }

docsDevEvLastTime OBJECT-TYPE
    SYNTAX      DateAndTime
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "When an entry reports only one event, this object will
        have the same value as the corresponding instance of
        docsDevEvFirstTime. When an entry reports multiple
        events, this object will record the value that
        docsDevDateTime had when the most recent event for this
        entry occurred."
    ::= { docsDevEventEntry 3 }

-- This object was renamed from docsDevEvCount to meet naming
-- requirements for Counter32
docsDevEvCounts OBJECT-TYPE
    SYNTAX      Counter32
    UNITS        "events"

```

```
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "The number of consecutive event instances reported by
    this entry.  This starts at 1 with the creation of this
    row and increments by 1 for each subsequent duplicate
    event."
 ::= { docsDevEventEntry 4 }
docsDevEvLevel OBJECT-TYPE
SYNTAX INTEGER {
    emergency(1),
    alert(2),
    critical(3),
    error(4),
    warning(5),
    notice(6),
    information(7),
    debug(8)
}
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "The priority level of this event, as defined by the
    vendor.  These are ordered from most serious (emergency)
    to least serious (debug).

    emergency(1) events indicate vendor-specific fatal
    hardware or software errors that prevent normal system
    operation.

    alert(2) events indicate a serious failure that causes
    the reporting system to reboot but that is not caused by
    hardware or software malfunctioning.

    critical(3) events indicate a serious failure that
    requires attention and prevents the device from
    transmitting data but that could be recovered without
    rebooting the system.

    error(4) and warning(5) events indicate that a failure
    occurred that could interrupt the normal data flow but
    that does not cause the device to re-register.

    notice(6) and information(7) events indicate a
    milestone or checkpoint in normal operation that could
    be of particular importance for troubleshooting.

    debug(8) events are reserved for vendor-specific
```

events.

During normal operation, no event more critical than notice(6) should be generated. Events between warning and emergency should be generated at appropriate levels of problems (e.g., emergency when the box is about to crash)."

::= { docsDevEventEntry 5 }

--

-- It is strongly recommended that implementors follow the CableLabs  
-- enumerations for docsDevEvId, per the DOCSIS OSSIV1.1 spec  
-- and follow-on specifications.

--

docsDevEvId OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"For this product, uniquely identifies the type of event that is reported by this entry."

REFERENCE

"DOCSIS OSSIV 1.1 Specification, Appendix H and  
DOCSIS OSSIV 2.0 Specification, Annex D."

::= { docsDevEventEntry 6 }

docsDevEvText OBJECT-TYPE

SYNTAX SnmpAdminString

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Provides a human-readable description of the event, including all relevant context (interface numbers, etc.)."

::= { docsDevEventEntry 7 }

docsDevEvSyslogAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The type of address of docsDevEvSyslogAddress. If no syslog server exists, this value should return unknown(0)."

DEFVAL { unknown }

::= { docsDevEvent 9 }

docsDevEvSyslogAddress OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The Internet address of the Syslog server, as provided by DHCP option 7 or set via SNMP management. If the address of the server is set to the zero-length string, the 0.0.0.0 IPv4 address, or the 0: IPv6 address, Syslog transmission is inhibited.

Note that if multiple values are provided to the CM in DHCP option 7, the value of this MIB object MUST be the first Syslog server address received.

By default at agent boot, this object returns the zero length string."

::= { docsDevEvent 10 }

docsDevEvThrottleThresholdExceeded OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"If true(1), trap and syslog transmission is currently inhibited due to exceeding the trap/syslog event threshold in the current interval."

::= { docsDevEvent 11 }

--

-- Link Level Control Filtering

--

docsDevFilter OBJECT IDENTIFIER ::= { docsDevMIBObjects 6 }

docsDevFilterLLCUnmatchedAction OBJECT-TYPE

SYNTAX INTEGER {

discard(1),

accept(2)

}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"LLC (Link Level Control) filters can be defined on an inclusive or exclusive basis: CMs can be configured to forward only packets matching a set of layer three protocols, or to drop packets matching a set of layer three protocols. Typical use of these filters is to

filter out possibly harmful (given the context of a large metropolitan LAN) protocols.

If set to discard(1), any L2 packet that does not match at least one filter in the docsDevFilterLLCTable will be discarded. If set to accept(2), any L2 packet that does not match at least one filter in the docsDevFilterLLCTable will be accepted for further processing (e.g., bridging). In other words, if the packet does not match an entry in the table, it takes this action; if it does match an entry in the table, it takes the opposite of this action."

```
DEFVAL { accept }
::= { docsDevFilter 1 }
```

docsDevFilterLLCTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsDevFilterLLCEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A list of filters to apply to (bridged) LLC traffic. The filters in this table are applied to incoming traffic on the appropriate interface(s) prior to any further processing (e.g., before the packet is handed off for level 3 processing, or for bridging). The specific action taken when no filter is matched is controlled by docsDevFilterLLCUnmatchedAction. Table entries MUST NOT persist across reboots for any device."

```
::= { docsDevFilter 2 }
```

docsDevFilterLLCEntry OBJECT-TYPE

SYNTAX DocsDevFilterLLCEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Describes a single filter to apply to (bridged) LLC traffic received on a specified interface. "

INDEX { docsDevFilterLLCIndex }

```
::= { docsDevFilterLLCTable 1 }
```

DocsDevFilterLLCEntry ::= SEQUENCE {

docsDevFilterLLCIndex

Integer32,

docsDevFilterLLCStatus

RowStatus,

docsDevFilterLLCIfIndex

InterfaceIndexOrZero,

docsDevFilterLLCProtocolType

INTEGER,

docsDevFilterLLCProtocol

Integer32,

docsDevFilterLLCMatches

Counter32

```
}
```

```
docsDevFilterLLCIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "Index used for the identification of filters (note that
         LLC filter order is irrelevant)."
```

```
 ::= { docsDevFilterLLCEntry 1 }
```

```
docsDevFilterLLCStatus 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 changing any of the
         associated columns for this row while this object is set
         to active."

        Specifying only this object (with the
        appropriate index) on a CM is sufficient to create a
        filter row that matches all inbound packets on the
        ethernet interface and results in the packets being
        discarded. docsDevFilterLLCIfIndex (at least) must be
        specified on a CMTS to create a row."
```

```
 ::= { docsDevFilterLLCEntry 2 }
```

```
docsDevFilterLLCIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndexOrZero
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "The entry interface to which this filter applies. The
         value corresponds to ifIndex for either a CATV MAC or
         another network interface. If the value is zero, the
         filter applies to all interfaces. In Cable Modems, the
         default value is the customer side interface(s). In
         CMTSs, this object has to be specified to
         create a row in this table."

        Note that according to the DOCSIS OSSIV1.1
        specification, ifIndex '1' in the CM means that this
        row applies to all Cable Modem-to-CPE Interfaces
        (CMCI)."
```

```
REFERENCE
    "DOCSIS OSSIV 1.1 Specification, Section 3.3.4.1. and
     DOCSIS OSSIV 2.0 Specification, Section 6.3.4.1."
```

```
 ::= { docsDevFilterLLCEntry 3 }
```

```

docsDevFilterLLCProtocolType OBJECT-TYPE
    SYNTAX INTEGER {
        ethertype(1),
        dsap(2)
    }
    MAX-ACCESS read-create
    STATUS current
    DESCRIPTION
        "The format of the value in docsDevFilterLLCProtocol:
        either a two-byte Ethernet Ethertype, or a one-byte
        802.2 Service Access Point (SAP) value. ethertype(1)
        also applies to Standard Network Access Protocol
        (SNAP) encapsulated frames."
    DEFVAL { ethertype }
    ::= { docsDevFilterLLCEntry 4 }

docsDevFilterLLCProtocol OBJECT-TYPE
    SYNTAX Integer32 (0..65535)
    MAX-ACCESS read-create
    STATUS current
    DESCRIPTION
        "The layer-three protocol for which this filter applies.
        The protocol value format depends on
        docsDevFilterLLCProtocolType. Note that for SNAP
        frames, ethertype filtering is performed rather than
        Destination Service Access Point (DSAP) =0xAA."
    DEFVAL { 0 }
    ::= { docsDevFilterLLCEntry 5 }

docsDevFilterLLCMatches OBJECT-TYPE
    SYNTAX Counter32
    UNITS "matches"
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Counts the number of times this filter was matched."
    ::= { docsDevFilterLLCEntry 6 }

--
-- IPv4 Filtering
--

docsDevFilterIpDefault OBJECT-TYPE
    SYNTAX INTEGER {
        discard(1),
        accept(2)
    }
    MAX-ACCESS read-write

```

STATUS deprecated

DESCRIPTION

"The default behavior for (bridged) packets that do not match IP filters (or Internet filters, if implemented) is defined by docsDevFilterIpDefault.

If set to discard(1), all packets not matching an IP filter in docsDevFilterIpTable will be discarded. If set to accept(2), all packets not matching an IP filter or an Internet filter will be accepted for further processing (e.g., bridging)."

DEFVAL { accept }

::= { docsDevFilter 3 }

docsDevFilterIpTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsDevFilterIpEntry

MAX-ACCESS not-accessible

STATUS deprecated

DESCRIPTION

"An ordered list of filters or classifiers to apply to IP traffic. Filter application is ordered by the filter index, rather than by a best match algorithm (note that this implies that the filter table may have gaps in the index values). Packets that match no filters will have policy 0 in the docsDevFilterPolicyTable applied to them, if it exists. Otherwise, Packets that match no filters are discarded or forwarded according to the setting of docsDevFilterIpDefault.

Any IP packet can theoretically match multiple rows of this table. When considering a packet, the table is scanned in row index order (e.g., filter 10 is checked before filter 20). If the packet matches that filter (which means that it matches ALL criteria for that row), actions appropriate to docsDevFilterIpControl and docsDevFilterPolicyId are taken. If the packet was discarded processing is complete. If docsDevFilterIpContinue is set to true, the filter comparison continues with the next row in the table, looking for additional matches.

If the packet matches no filter in the table, the packet is accepted or dropped for further processing according to the setting of docsDevFilterIpDefault. If the packet is accepted, the actions specified by policy group 0 (e.g., the rows in docsDevFilterPolicyTable that have a value of 0 for docsDevFilterPolicyId) are taken, if that policy

group exists.

Logically, this table is consulted twice during the processing of any IP packet: once upon its acceptance from the L2 entity, and once upon its transmission to the L2 entity. In actuality, for cable modems, IP filtering is generally the only IP processing done for transit traffic. This means that inbound and outbound filtering can generally be done at the same time with one pass through the filter table.

The objects in this table are only accessible from cable devices that are not operating in DiffServ MIB mode (RFC 3289). See the conformance section for details.

Note that some devices are required by other specifications (e.g., the DOCSIS OSSiv1.1 specification) to support the legacy SNMPv1/v2c docsDevFilter mode for backward compatibility.

Table entries MUST NOT persist across reboots for any device.

This table is deprecated. Instead, use the DiffServ MIB from RFC 3289."

```
::= { docsDevFilter 4 }
```

docsDevFilterIpEntry OBJECT-TYPE

SYNTAX DocsDevFilterIpEntry

MAX-ACCESS not-accessible

STATUS deprecated

DESCRIPTION

"Describes a filter to apply to IP traffic received on a specified interface. All identity objects in this table (e.g., source and destination address/mask, protocol, source/dest port, TOS/mask, interface and direction) must match their respective fields in the packet for any given filter to match.

To create an entry in this table, docsDevFilterIpIfIndex must be specified."

```
INDEX { docsDevFilterIpIndex }
```

```
::= { docsDevFilterIpTable 1 }
```

DocsDevFilterIpEntry ::= SEQUENCE {

docsDevFilterIpIndex	Integer32,
docsDevFilterIpStatus	RowStatus,
docsDevFilterIpControl	INTEGER,

```

docsDevFilterIpIfIndex      InterfaceIndexOrZero,
docsDevFilterIpDirection    INTEGER,
docsDevFilterIpBroadcast    TruthValue,
docsDevFilterIpSaddr         IpAddress,
docsDevFilterIpSmask         IpAddress,
docsDevFilterIpDaddr         IpAddress,
docsDevFilterIpDmask         IpAddress,
docsDevFilterIpProtocol     Integer32,
docsDevFilterIpSourcePortLow Integer32,
docsDevFilterIpSourcePortHigh Integer32,
docsDevFilterIpDestPortLow  Integer32,
docsDevFilterIpDestPortHigh Integer32,
docsDevFilterIpMatches       ZeroBasedCounter32,
docsDevFilterIpTos           OCTET STRING,
docsDevFilterIpTosMask       OCTET STRING,
docsDevFilterIpContinue      TruthValue,
docsDevFilterIpPolicyId      Integer32
}

```

```

docsDevFilterIpIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS   not-accessible
    STATUS      deprecated
    DESCRIPTION
        "Index used to order the application of filters.
         The filter with the lowest index is always applied
         first."
    ::= { docsDevFilterIpEntry 1 }

```

```

docsDevFilterIpStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS      deprecated
    DESCRIPTION
        "Controls and reflects the status of rows in this
         table. Specifying only this object (with the
         appropriate index) on a CM is sufficient to create a
         filter row that matches all inbound packets on the
         ethernet interface and results in the packets being
         discarded. docsDevFilterIpIfIndex (at least) must be
         specified on a CMTS to create a row. Creation of the
         rows may be done via either create-and-wait or
         create-and-go, but the filter is not applied until this
         object is set to (or changes to) active. There is no
         restriction in changing any object in a row while this
         object is set to active."
    ::= { docsDevFilterIpEntry 2 }

```

## docsDevFilterIpControl OBJECT-TYPE

```
SYNTAX INTEGER {
    discard(1),
    accept(2),
    policy(3)
}
```

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

```
STATUS        deprecated
```

## DESCRIPTION

"If set to discard(1), all packets matching this filter will be discarded, and scanning of the remainder of the filter list will be aborted. If set to accept(2), all packets matching this filter will be accepted for further processing (e.g., bridging). If docsDevFilterIpContinue is set to true, see if there are other matches; otherwise, done. If set to policy (3), execute the policy entries matched by docsDevFilterIpPolicyId in docsDevFilterPolicyTable.

If docsDevFilterIpContinue is set to true, continue scanning the table for other matches; otherwise, done."

```
DEFVAL { discard }
```

```
::= { docsDevFilterIpEntry 3 }
```

## docsDevFilterIpIfIndex OBJECT-TYPE

```
SYNTAX        InterfaceIndexOrZero
```

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

```
STATUS        deprecated
```

## DESCRIPTION

"The entry interface to which this filter applies. The value corresponds to ifIndex for either a CATV MAC or another interface. If the value is zero, the filter applies to all interfaces. Default value in CMs is the index of the customer-side (e.g., ethernet) interface(s). In CMTSes, this object MUST be specified to create a row in this table.

Note that according to the DOCSIS OSSIV1.1 specification, ifIndex '1' in the Cable Modem means that this row applies to all CMCI (customer-facing) interfaces."

## REFERENCE

"DOCSIS OSSI 1.1 Specification, Section 3.3.4.1. and DOCSIS OSSI 2.0 Specification, Section 6.3.4.1."

```
::= { docsDevFilterIpEntry 4 }
```

## docsDevFilterIpDirection OBJECT-TYPE

```
SYNTAX INTEGER {
    inbound(1),
    outbound(2),
    both(3)
}
MAX-ACCESS read-create
STATUS deprecated
DESCRIPTION
    "Determines whether the filter is applied to inbound(1)
    traffic, outbound(2) traffic, or traffic in both(3)
    directions."
DEFVAL { inbound }
::= { docsDevFilterIpEntry 5 }
```

docsDevFilterIpBroadcast OBJECT-TYPE

```
SYNTAX TruthValue
MAX-ACCESS read-create
STATUS deprecated
DESCRIPTION
    "If set to true(1), the filter only applies to multicast
    and broadcast traffic. If set to false(2), the filter
    applies to all traffic."
DEFVAL { false }
::= { docsDevFilterIpEntry 6 }
```

docsDevFilterIpSaddr OBJECT-TYPE

```
SYNTAX IpAddress
MAX-ACCESS read-create
STATUS deprecated
DESCRIPTION
    "The source IP address, or portion thereof, that is to be
    matched for this filter. The source address is first
    masked (ANDed) against docsDevFilterIpSmask before
    being compared to this value. A value of 0 for this
    object and 0 for the mask matches all IP addresses."
DEFVAL { '00000000'h }
::= { docsDevFilterIpEntry 7 }
```

docsDevFilterIpSmask OBJECT-TYPE

```
SYNTAX IpAddress
MAX-ACCESS read-create
STATUS deprecated
DESCRIPTION
    "A bit mask that is to be applied to the source address
    prior to matching. This mask is not necessarily the
    same as a subnet mask, but 1s bits must be leftmost and
    contiguous."
DEFVAL { '00000000'h }
```

```
 ::= { docsDevFilterIpEntry 8 }

docsDevFilterIpDaddr OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS   read-create
    STATUS       deprecated
    DESCRIPTION
        "The destination IP address, or portion thereof, that is
         to be matched for this filter. The destination address
         is first masked (ANDed) against docsDevFilterIpDmask
         before being compared to this value. A value of
         00000000 for this object and 00000000 for the mask
         matches all IP addresses."
    DEFVAL { '00000000'h }
 ::= { docsDevFilterIpEntry 9 }

docsDevFilterIpDmask OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS   read-create
    STATUS       deprecated
    DESCRIPTION
        "A bit mask that is to be applied to the destination
         address prior to matching. This mask is not necessarily
         the same as a subnet mask, but 1s bits MUST be leftmost
         and contiguous."
    DEFVAL { '00000000'h }
 ::= { docsDevFilterIpEntry 10 }

docsDevFilterIpProtocol OBJECT-TYPE
    SYNTAX      Integer32 (0..256)
    MAX-ACCESS   read-create
    STATUS       deprecated
    DESCRIPTION
        "The IP protocol value that is to be matched. For
         example, icmp is 1, tcp is 6, and udp is 17. A value of
         256 matches ANY protocol."
    REFERENCE   "www.iana.org/assignments/protocol-numbers"
    DEFVAL { 256 }
 ::= { docsDevFilterIpEntry 11 }

docsDevFilterIpSourcePortLow OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS   read-create
    STATUS       deprecated
    DESCRIPTION
        "This is the inclusive lower bound of the transport-layer
         source port range that is to be matched. If the IP
         protocol of the packet is neither UDP nor TCP, this
```

```
        object is ignored during matching."
REFERENCE "www.iana.org/assignments/port-numbers"
DEFVAL { 0 }
::= { docsDevFilterIpEntry 12 }

docsDevFilterIpSourcePortHigh OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "This is the inclusive upper bound of the transport-layer
        source port range that is to be matched.  If the IP
        protocol of the packet is neither UDP nor TCP, this
        object is ignored during matching."
    REFERENCE "www.iana.org/assignments/port-numbers"
    DEFVAL { 65535 }
    ::= { docsDevFilterIpEntry 13 }

docsDevFilterIpDestPortLow OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "This is the inclusive lower bound of the transport-layer
        destination port range that is to be matched.  If the IP
        protocol of the packet is neither UDP nor TCP, this
        object is ignored during matching."
    REFERENCE "www.iana.org/assignments/port-numbers"
    DEFVAL { 0 }
    ::= { docsDevFilterIpEntry 14 }

docsDevFilterIpDestPortHigh OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "This is the inclusive upper bound of the transport-layer
        destination port range that is to be matched.  If the IP
        protocol of the packet is neither UDP nor TCP, this
        object is ignored during matching."
    REFERENCE "www.iana.org/assignments/port-numbers"
    DEFVAL { 65535 }
    ::= { docsDevFilterIpEntry 15 }

docsDevFilterIpMatches OBJECT-TYPE
    SYNTAX      ZeroBasedCounter32
    UNITS       "matches"
    MAX-ACCESS  read-only
```

```

STATUS      deprecated
DESCRIPTION
    "Counts the number of times this filter was matched.
    This object is initialized to 0 at boot, or at row
    creation, and is reset only upon reboot."
 ::= { docsDevFilterIpEntry 16 }

```

```

docsDevFilterIpTos OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (1))
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "This is the value to be matched to the packet's
        TOS (Type of Service) value (after the TOS value
        is ANDed with docsDevFilterIpTosMask). A value for this
        object of 0 and a mask of 0 matches all TOS values."
    DEFVAL { '00'h }
    ::= { docsDevFilterIpEntry 17 }

```

```

docsDevFilterIpTosMask OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (1))
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "The mask to be applied to the packet's TOS value before
        matching."
    DEFVAL { '00'h }
    ::= { docsDevFilterIpEntry 18 }

```

```

docsDevFilterIpContinue OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "If this value is set to true and docsDevFilterIpControl
        is anything but discard (1), continue scanning and
        applying policies. See Section 3.3.3 for more
        details."
    DEFVAL { false }
    ::= { docsDevFilterIpEntry 19 }

```

```

docsDevFilterIpPolicyId OBJECT-TYPE
    SYNTAX      Integer32 (0..2147483647)
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "This object points to an entry in
        docsDevFilterPolicyTable. If docsDevFilterIpControl

```

is set to policy (3), execute all matching policies in docsDevFilterPolicyTable. If no matching policy exists, treat as if docsDevFilterIpControl were set to accept (1). If this object is set to the value of 0, there is no matching policy, and docsDevFilterPolicyTable MUST NOT be consulted."

```
DEFVAL { 0 }
 ::= { docsDevFilterIpEntry 20 }
```

```
--
-- Policy Mapping Table
--
```

docsDevFilterPolicyTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsDevFilterPolicyEntry

MAX-ACCESS not-accessible

STATUS deprecated

DESCRIPTION

"A Table that maps between a policy group ID and a set of pointers to policies to be applied. All rows with the same docsDevFilterPolicyId are part of the same group of policy pointers and are applied in the order in this table. docsDevFilterPolicyTable exists to allow multiple policy actions (referenced by policy pointers) to be applied to any given classified packet. The policy actions are applied in index order. For example:

Index	ID	Type	Action
1	1	TOS	1
9	5	TOS	1
12	1	IPSEC	3

This says that a packet that matches a filter with policy id 1 first has TOS policy 1 applied (which might set the TOS bits to enable a higher priority) and next has the IPSEC policy 3 applied (which may result in the packets being dumped into a secure VPN to a remote encryptor).

Policy ID 0 is reserved for default actions and is applied only to packets that match no filters in docsDevFilterIpTable.

Table entries MUST NOT persist across reboots for any device.

This table is deprecated. Instead, use the DiffServ MIB

```

        from RFC 3289."
 ::= { docsDevFilter 5 }

docsDevFilterPolicyEntry OBJECT-TYPE
    SYNTAX      DocsDevFilterPolicyEntry
    MAX-ACCESS  not-accessible
    STATUS      deprecated
    DESCRIPTION
        "An entry in the docsDevFilterPolicyTable. Entries are
        created by Network Management. To create an entry,
        docsDevFilterPolicyId MUST be specified."
    INDEX { docsDevFilterPolicyIndex }
    ::= { docsDevFilterPolicyTable 1 }

DocsDevFilterPolicyEntry ::= SEQUENCE {
    docsDevFilterPolicyIndex  Integer32,
    docsDevFilterPolicyId    Integer32,
    docsDevFilterPolicyType  INTEGER,
    docsDevFilterPolicyAction Integer32,
    docsDevFilterPolicyStatus RowStatus,
    docsDevFilterPolicyPtr   RowPointer
}

docsDevFilterPolicyIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS  not-accessible
    STATUS      deprecated
    DESCRIPTION "Index value for the table."
    ::= { docsDevFilterPolicyEntry 1 }

docsDevFilterPolicyId OBJECT-TYPE
    SYNTAX      Integer32 (0..2147483647)
    MAX-ACCESS  read-create
    STATUS      deprecated
    DESCRIPTION
        "Policy ID for this entry. If a policy ID can apply to
        multiple rows of this table, all relevant policies are
        executed. Policy 0 (if populated) is applied to all
        packets that do not match any of the filters. N.B. If
        docsDevFilterIpPolicyId is set to 0, it DOES NOT match
        policy 0 of this table."
    ::= { docsDevFilterPolicyEntry 2 }

-- The following two objects were removed and never used; however,
-- to preserve OID numbering, they are simply commented out to
-- to ensure that they are not used again.
-- docsDevFilterPolicyType ::= { docsDevFilterPolicyEntry 3 }
-- docsDevFilterPolicyAction ::= { docsDevFilterPolicyEntry 4 }

```

## docsDevFilterPolicyStatus OBJECT-TYPE

SYNTAX RowStatus  
 MAX-ACCESS read-create  
 STATUS deprecated  
 DESCRIPTION

"Object used to create an entry in this table. There is no restriction in changing any object in a row while this object is set to active. The following object MUST have a valid value before this object can be set to active: docsDevFilterPolicyPtr."

::= { docsDevFilterPolicyEntry 5 }

## docsDevFilterPolicyPtr OBJECT-TYPE

SYNTAX RowPointer  
 MAX-ACCESS read-create  
 STATUS deprecated  
 DESCRIPTION

"This object points to a row in an applicable filter policy table. Currently, the only standard policy table is docsDevFilterTosTable.

Per the textual convention, this object points to the first accessible object in the row; e.g., to point to a row in docsDevFilterTosTable with an index of 21, the value of this object would be the object identifier docsDevTosStatus.21.

Vendors are recommended to adhere to the same convention when adding vendor-specific policy table extensions.

If this pointer references an empty or non-existent row, then no policy action is taken.

The default upon row creation is a null pointer that results in no policy action being taken."

DEFVAL { zeroDotZero }

::= { docsDevFilterPolicyEntry 6 }

--

-- TOS Policy action table

--

## docsDevFilterTosTable OBJECT-TYPE

SYNTAX SEQUENCE OF DocsDevFilterTosEntry  
 MAX-ACCESS not-accessible  
 STATUS deprecated  
 DESCRIPTION

"Table used to describe Type of Service (TOS) bits

processing.

This table is an adjunct to the docsDevFilterIpTable and the docsDevFilterPolicy table. Entries in the latter table can point to specific rows in this (and other) tables and cause specific actions to be taken. This table permits the manipulation of the value of the Type of Service bits in the IP header of the matched packet as follows:

```
Set the tosBits of the packet to
(tosBits & docsDevFilterTosAndMask) |
docsDevFilterTosOrMask
```

This construct allows you to do a clear and set of all the TOS bits in a flexible manner.

Table entries MUST NOT persist across reboots for any device.

This table is deprecated. Instead, use the DiffServ MIB from RFC 3289."

```
::= { docsDevFilter 6 }
```

```
docsDevFilterTosEntry OBJECT-TYPE
    SYNTAX      DocsDevFilterTosEntry
    MAX-ACCESS   not-accessible
    STATUS      deprecated
    DESCRIPTION
        "A TOS policy entry."
    INDEX { docsDevFilterTosIndex }
    ::= { docsDevFilterTosTable 1 }
```

```
DocsDevFilterTosEntry ::= SEQUENCE {
    docsDevFilterTosIndex      Integer32,
    docsDevFilterTosStatus     RowStatus,
    docsDevFilterTosAndMask    OCTET STRING,
    docsDevFilterTosOrMask     OCTET STRING
}
```

```
docsDevFilterTosIndex OBJECT-TYPE
    SYNTAX      Integer32 (1..2147483647)
    MAX-ACCESS   not-accessible
    STATUS      deprecated
    DESCRIPTION
        "The unique index for this row. There are no ordering
        requirements for this table, and any valid index may be
        specified."
```

```

 ::= { docsDevFilterTosEntry 1 }

docsDevFilterTosStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       deprecated
    DESCRIPTION
        "The object used to create and delete entries in this
        table. A row created by specifying just this object
        results in a row that specifies no change to the TOS
        bits. A row may be created using either the
        create-and-go or create-and-wait paradigms. There is
        no restriction on the ability to change values in this
        row while the row is active."
 ::= { docsDevFilterTosEntry 2 }

docsDevFilterTosAndMask OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (1))
    MAX-ACCESS   read-create
    STATUS       deprecated
    DESCRIPTION
        "This value is bitwise ANDed with the matched packet's
        TOS bits."
    DEFVAL { 'ff'h }
 ::= { docsDevFilterTosEntry 3 }

docsDevFilterTosOrMask OBJECT-TYPE
    SYNTAX      OCTET STRING (SIZE (1))
    MAX-ACCESS   read-create
    STATUS       deprecated
    DESCRIPTION
        "This value is bitwise ORed with the result from the
        AND procedure (tosBits & docsDevFilterTosAndMask).
        The result then replaces the packet's TOS bits."
    DEFVAL { '00'h }
 ::= { docsDevFilterTosEntry 4 }

--
-- CPE IP Management and anti-spoofing group. Only implemented on
-- Cable Modems.
--

docsDevCpe OBJECT IDENTIFIER ::= { docsDevMIBObjects 7 }

docsDevCpeEnroll OBJECT-TYPE
    SYNTAX      INTEGER {
        none(1),
        any(2)
    }

```

```

}
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION
    "This object controls the population of
    docsDevFilterCpeTable.
    If set to none, the filters must be set manually
    by a network management action (either configuration
    or SNMP set).
    If set to any, the CM wiretaps the packets originating
    from the ethernet and enrolls up to docsDevCpeIpMax
    addresses as based on the source IPv4 or v6 addresses of
    those packets."
DEFVAL { any }
::= { docsDevCpe 1 }

```

## docsDevCpeIpMax OBJECT-TYPE

```

SYNTAX        Integer32 (-1..2147483647)
MAX-ACCESS    read-write
STATUS        current
DESCRIPTION
    "This object controls the maximum number of CPEs allowed
    to be learned behind this device.  If set to zero, any
    number of CPEs may connect up to the maximum permitted
    for the device.
    If set to -1, no filtering is done on CPE source
    addresses, and no entries are made in the
    docsDevFilterCpeTable via learning.  If an attempt is
    made to set this to a number greater than that
    permitted for the device, it is set to that maximum."
DEFVAL { -1 }
::= { docsDevCpe 2 }

```

## docsDevCpeTable OBJECT-TYPE

```

SYNTAX        SEQUENCE OF DocsDevCpeEntry
MAX-ACCESS    not-accessible
STATUS        deprecated
DESCRIPTION
    "This table lists the IPv4 addresses seen (or permitted)
    as source addresses in packets originating from the
    customer interface on this device.  In addition, this
    table can be provisioned with the specific addresses
    permitted for the CPEs via the normal row creation
    mechanisms.  Table entries MUST NOT persist across
    reboots for any device.

```

N.B. Management action can add entries in this table  
and in docsDevCpeIpTable past the value of

docsDevCpeIpMax. docsDevCpeIpMax ONLY restricts the ability of the CM to add learned addresses automatically.

This table is deprecated and is replaced by docsDevCpeInetTable."

```
::= { docsDevCpe 3 }
```

docsDevCpeEntry OBJECT-TYPE

SYNTAX DocsDevCpeEntry

MAX-ACCESS not-accessible

STATUS deprecated

DESCRIPTION

"An entry in the docsDevFilterCpeTable. There is one entry for each IPv4 CPE seen or provisioned. If docsDevCpeIpMax is set to -1, this table is ignored; otherwise, upon receipt of an IP packet from the customer interface of the CM, the source IP address is checked against this table. If the address is in the table, packet processing continues. If the address is not in the table but docsDevCpeEnroll is set to any and the sum of the table sizes of docsDevCpeTable and docsDevCpeInetTable is less than docsDevCpeIpMax, the address is added to the table, and packet processing continues. Otherwise, the packet is dropped.

The filtering actions specified by this table occur after any LLC filtering (docsDevFilterLLCTable), but prior to any IP filtering (docsDevFilterIpTable, docsDevNmAccessTable)."

INDEX { docsDevCpeIp }

```
::= { docsDevCpeTable 1 }
```

DocsDevCpeEntry ::= SEQUENCE {

docsDevCpeIp IpAddress,

docsDevCpeSource INTEGER,

docsDevCpeStatus RowStatus

}

docsDevCpeIp OBJECT-TYPE

SYNTAX IpAddress

MAX-ACCESS not-accessible

STATUS deprecated

DESCRIPTION

"The IPv4 address to which this entry applies.

N.B. Attempts to set all zeros or all ones address values MUST be rejected."

```

 ::= { docsDevCpeEntry 1 }

docsDevCpeSource OBJECT-TYPE
    SYNTAX      INTEGER {
        other(1),
        manual(2),
        learned(3)
    }

    MAX-ACCESS   read-only
    STATUS       deprecated
    DESCRIPTION
        "This object describes how this entry was created.  If
        the value is manual(2), this row was created by a
        network management action (either configuration or
        SNMP set).  If set to learned(3), then it was found via
        looking at the source IPv4 address of a received packet.
        The value other(1) is used for any entries that do not
        meet manual(2) or learned(3) criteria."
    ::= { docsDevCpeEntry 2 }

docsDevCpeStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       deprecated
    DESCRIPTION
        "Standard object to manipulate rows.  To create a row in
        this table, one only needs to specify this object.
        Management stations SHOULD use the create-and-go
        mechanism for creating rows in this table."
    ::= { docsDevCpeEntry 3 }

--
-- Internet CPE Management and anti spoofing group, for support of
-- non-IPv4 CPEs.
--

docsDevCpeInetTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF DocsDevCpeInetEntry
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "This table lists the IP addresses seen (or permitted) as
        source addresses in packets originating from the
        customer interface on this device.  In addition, this
        table can be provisioned with the specific addresses
        permitted for the CPEs via the normal row creation
        mechanisms."

```

N.B. Management action can add entries in this table and in docsDevCpeIpTable past the value of docsDevCpeIpMax. docsDevCpeIpMax ONLY restricts the ability of the CM to add learned addresses automatically.

Table entries MUST NOT persist across reboots for any device.

This table exactly mirrors docsDevCpeTable and applies to IPv4 and IPv6 addresses."

```
::= { docsDevCpe 4 }
```

docsDevCpeInetEntry OBJECT-TYPE

SYNTAX DocsDevCpeInetEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the docsDevFilterCpeInetTable. There is one entry for each IP CPE seen or provisioned. If docsDevCpeIpMax is set to -1, this table is ignored; otherwise, upon receipt of an IP packet from the customer interface of the CM, the source IP address is checked against this table. If the address is in the table, packet processing continues. If the address is not in the table but docsDevCpeEnroll is set to any and the sum of the table sizes for docsDevCpeTable and docsDevCpeInetTable is less than docsDevCpeIpMax, the address is added to the table, and packet processing continues. Otherwise, the packet is dropped.

The filtering actions specified by this table occur after any LLC filtering (docsDevFilterLLCTable), but prior to any IP filtering (docsDevFilterIpTable, docsDevNmAccessTable).

When an agent (cable modem) restarts, then all dynamically created rows are lost."

INDEX { docsDevCpeInetType, docsDevCpeInetAddr }

```
::= { docsDevCpeInetTable 1 }
```

DocsDevCpeInetEntry ::= SEQUENCE {

docsDevCpeInetType InetAddressType,

docsDevCpeInetAddr InetAddress,

docsDevCpeInetSource INTEGER,

docsDevCpeInetRowStatus RowStatus

}

```
docsDevCpeInetType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "The type of internet address of docsDevCpeInetAddr."
        ::= { docsDevCpeInetEntry 1 }

docsDevCpeInetAddr OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "The Internet address to which this entry applies.

        Implementors need to be aware that if the size of
        docsDevCpeInetAddr exceeds 114 octets OIDs of
        instances of columns in this row will have more
        than 128 sub-identifiers and cannot be accessed
        using SNMPv1, SNMPv2c, or SNMPv3. Only unicast
        address are allowed for this object."
        ::= { docsDevCpeInetEntry 2 }

docsDevCpeInetSource OBJECT-TYPE
    SYNTAX      INTEGER {
        manual(2),
        learned(3)
    }
    MAX-ACCESS   read-only
    STATUS       current
    DESCRIPTION
        "This object describes how this entry was created.  If
        the value is manual(2), this row was created by a
        network management action (either configuration or
        SNMP set).  If set to learned(3), then it was found
        via looking at the source IP address of a received
        packet."
        ::= { docsDevCpeInetEntry 3 }

docsDevCpeInetRowStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "Standard object to manipulate rows.  To create a row in
        this table, one only needs to specify this object.
        Management stations SHOULD use the create-and-go
        mechanism for creating rows in this table."
```

```
 ::= { docsDevCpeInetEntry 4 }

--
-- Placeholder for notifications/traps.
--

-- erroneous, DO NOT USE docsDevNotification
docsDevNotification OBJECT IDENTIFIER ::= { docsDev 2 }
-- erroneous, DO NOT USE docsDevNotification

docsDevNotifications OBJECT IDENTIFIER ::= { docsDev 0 }

--
-- RFC 2669 Conformance definitions
--

docsDevConformance OBJECT IDENTIFIER ::= { docsDev 3 }
docsDevGroups OBJECT IDENTIFIER ::= { docsDevConformance 1 }
docsDevCompliances OBJECT IDENTIFIER ::= { docsDevConformance 2 }

docsDevBasicCompliance MODULE-COMPLIANCE
    STATUS deprecated
    DESCRIPTION
        "The RFC 2669 compliance statement for MCNS/DOCSIS
        Cable Modems and Cable Modem Termination Systems."

MODULE -- docsDev

-- conditionally mandatory groups

GROUP docsDevBaseGroup
    DESCRIPTION
        "Mandatory in Cable Modems, optional in Cable Modem
        Termination Systems."

GROUP docsDevEventGroup
    DESCRIPTION
        "Mandatory in Cable Modems, optional in Cable Modem
        Termination Systems."

GROUP docsDevFilterGroup
    DESCRIPTION
        "Mandatory in Cable Modems, optional in Cable Modem
        Termination Systems."

GROUP docsDevNmAccessGroup
```

## DESCRIPTION

"This group is only implemented in devices that do not implement the SNMPv3 User Security Model. It SHOULD NOT be implemented by devices that conform to SNMPv3.

For devices that do not implement SNMPv3 or later, this group is Mandatory in Cable Modems and is optional in Cable Modem Termination Systems."

## GROUP docsDevServerGroup

## DESCRIPTION

"This group is implemented only in Cable Modems, and is not implemented in Cable Modem Termination Systems."

## GROUP docsDevSoftwareGroup

## DESCRIPTION

"This group is Mandatory in Cable Modems and optional in Cable Modem Termination Systems."

## GROUP docsDevCpeGroup

## DESCRIPTION

"This group is Mandatory in Cable Modems, and is not implemented in Cable Modem Termination Systems."

## OBJECT docsDevSTPControl

MIN-ACCESS read-only

## DESCRIPTION

"It is compliant to implement this object as read-only. Devices need only support noStFilterBpdu(2)."

## OBJECT docsDevNmAccessIp

## DESCRIPTION

"It is compliant to recognize the IP address 255.255.255.255 as referring to any NMS."

## OBJECT docsDevEvReporting

MIN-ACCESS read-only

## DESCRIPTION

"It is compliant to implement this object as read-only. Devices need only support local(0). An agent need not enforce that trap or syslog logging be accompanied by local(0) or localVolatile(3) logging."

::= { docsDevCompliances 1 }

## docsDevBaseGroup OBJECT-GROUP

## OBJECTS {

docsDevRole,  
docsDevDateTime,

```
        docsDevResetNow,
        docsDevSerialNumber,
        docsDevSTPControl
    }
    STATUS          current
    DESCRIPTION
        "A collection of objects providing device status and
        control."
    ::= { docsDevGroups 1 }

docsDevNmAccessGroup OBJECT-GROUP
    OBJECTS {
        docsDevNmAccessIp,
        docsDevNmAccessIpMask,
        docsDevNmAccessCommunity,
        docsDevNmAccessControl,
        docsDevNmAccessInterfaces,
        docsDevNmAccessStatus
    }
    STATUS          deprecated
    DESCRIPTION
        "A collection of objects for controlling access to SNMP
        objects on cable devices.

        This group has been deprecated because all the
        objects have been deprecated in favor of SNMPv3 and
        Coexistence MIBs."
    ::= { docsDevGroups 2 }

docsDevSoftwareGroup OBJECT-GROUP
    OBJECTS {
        docsDevSwServer,
        docsDevSwFilename,
        docsDevSwAdminStatus,
        docsDevSwOperStatus,
        docsDevSwCurrentVers
    }
    STATUS          deprecated
    DESCRIPTION
        "A collection of objects for controlling software
        downloads.

        This group has been deprecated and replaced by
        docsDevSoftwareGroupV2. Object docsDevSwServer
        has been replaced by docsDevSwServerAddressType
        and docsDevSwServerAddress, and
        docsDevSwServerTransportProtocol has been added to
        support TFTP and HTTP firmware downloads."
```

```
::= { docsDevGroups 3 }
```

```
docsDevServerGroup OBJECT-GROUP
```

```
OBJECTS {
    docsDevServerBootState,
    docsDevServerDhcp,
    docsDevServerTime,
    docsDevServerTftp,
    docsDevServerConfigFile
}
```

```
STATUS      deprecated
```

```
DESCRIPTION
```

```
"A collection of objects providing status about server
provisioning.
```

```

This group has been deprecated and replaced by
docsDevServerGroupV2. The objects docsDevServerDhcp,
docsDevServerTime, and docsDevServerTftp have
been replaced by docsDevServerDhcpAddressType,
docsDevServerDhcpAddress, docsDevServerTimeAddressType,
docsDevServerTimeAddress,
docsDevServerConfigTftpAddressType, and
docsDevServerConfigTftpAddress."
```

```
::= { docsDevGroups 4 }
```

```
docsDevEventGroup OBJECT-GROUP
```

```
OBJECTS {
    docsDevEvControl,
    docsDevEvSyslog,
    docsDevEvThrottleAdminStatus,
    docsDevEvThrottleInhibited,
    docsDevEvThrottleThreshold,
    docsDevEvThrottleInterval,
    docsDevEvReporting,
    docsDevEvFirstTime,
    docsDevEvLastTime,
    docsDevEvCounts,
    docsDevEvLevel,
    docsDevEvId,
    docsDevEvText
}
```

```
STATUS      deprecated
```

```
DESCRIPTION
```

```
"A collection of objects used to control and monitor
events.
```

```

This group has been deprecated and replaced by
docsDevEventGroupV2. The object docsDevEvSyslog has
```

```

        been replaced by docsDevEvSyslogAddressType and
        docsDevEvSyslogAddress, and docsDevEvThrottleInhibited
        has been replaced by
        docsDevEvThrottleThresholdExceeded."
 ::= { docsDevGroups 5 }

```

```
docsDevFilterGroup OBJECT-GROUP
```

```

OBJECTS {
    docsDevFilterLLCUnmatchedAction,
    docsDevFilterIpDefault,
    docsDevFilterLLCStatus,
    docsDevFilterLLCIfIndex,
    docsDevFilterLLCProtocolType,
    docsDevFilterLLCProtocol,
    docsDevFilterLLCMatches,
    docsDevFilterIpControl,
    docsDevFilterIpIfIndex,
    docsDevFilterIpStatus,
    docsDevFilterIpDirection,
    docsDevFilterIpBroadcast,
    docsDevFilterIpSaddr,
    docsDevFilterIpSmask,
    docsDevFilterIpDaddr,
    docsDevFilterIpDmask,
    docsDevFilterIpProtocol,
    docsDevFilterIpSourcePortLow,
    docsDevFilterIpSourcePortHigh,
    docsDevFilterIpDestPortLow,
    docsDevFilterIpDestPortHigh,
    docsDevFilterIpMatches,
    docsDevFilterIpTos,
    docsDevFilterIpTosMask,
    docsDevFilterIpContinue,
    docsDevFilterIpPolicyId,
    docsDevFilterPolicyId,
    docsDevFilterPolicyStatus,
    docsDevFilterPolicyPtr,
    docsDevFilterTosStatus,
    docsDevFilterTosAndMask,
    docsDevFilterTosOrMask
}

```

```
STATUS      deprecated
```

```
DESCRIPTION
```

```

    "A collection of objects to specify filters at the link
    layer and IPv4 layer.

```

```

    This group has been deprecated and replaced by various
    groups from the DiffServ MIB."

```

```
 ::= { docsDevGroups 6 }

docsDevCpeGroup OBJECT-GROUP
    OBJECTS {
        docsDevCpeEnroll,
        docsDevCpeIpMax,
        docsDevCpeSource,
        docsDevCpeStatus
    }
    STATUS      deprecated
    DESCRIPTION
        "A collection of objects used to control the number
        and specific values of IPv4 addresses allowed for
        associated Customer Premises Equipment (CPE).

        This group has been deprecated and replaced by
        docsDevInetCpeGroup. The object docsDevCpeSource has
        been replaced by docsDevCpeInetSource, and
        docsDevCpeStatus has been replaced by
        docsDevCpeInetRowStatus."
    ::= { docsDevGroups 7 }

--
-- RFC 4639 Conformance definitions
--

docsDevGroupsV2          OBJECT IDENTIFIER ::= { docsDevConformance 3 }
docsDevCompliancesV2     OBJECT IDENTIFIER ::= { docsDevConformance 4 }

docsDevCmCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement for DOCSIS Cable Modems.

        This compliance statement applies to implementations
        of DOCSIS versions that are not IPv6 capable."

MODULE DIFFSERV-MIB -- RFC 3289

MANDATORY-GROUPS {
    diffServMIBDataPathGroup,
    diffServMIBClfrGroup,
    diffServMIBClfrElementGroup,
    diffServMIBMultiFieldClfrGroup,
    diffServMIBActionGroup,
    diffServMIBDscpMarkActGroup,
    diffServMIBCounterGroup,
    diffServMIBAlgDropGroup
}
```

```
    }

OBJECT diffServDataPathStatus -- same as RFC 3289
    SYNTAX RowStatus { active(1) }
    WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
    DESCRIPTION
        "Support for createAndWait and notInService is not
        required."

OBJECT diffServClfrStatus -- same as RFC 3289
    SYNTAX RowStatus { active(1) }
    WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
    DESCRIPTION
        "Support for createAndWait and notInService is not
        required."

OBJECT diffServClfrElementStatus -- same as RFC 3289
    SYNTAX RowStatus { active(1) }
    WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
    DESCRIPTION
        "Support for createAndWait and notInService is not
        required."

OBJECT diffServMultiFieldClfrAddrType
    SYNTAX InetAddressType { ipv4(1) }
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."

OBJECT diffServMultiFieldClfrSrcAddr
    SYNTAX InetAddress (SIZE(4))
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."

OBJECT diffServMultiFieldClfrDstAddr
    SYNTAX InetAddress (SIZE(4))
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."

OBJECT diffServAlgDropStatus -- same as RFC 3289
    SYNTAX RowStatus { active(1) }
    WRITE-SYNTAX RowStatus { createAndGo(4), destroy(6) }
    DESCRIPTION
        "Support for createAndWait and notInService is not
        required."
```

```
OBJECT diffServDataPathStorage
    SYNTAX StorageType { volatile(2) }
    DESCRIPTION
        "An implementation is only required to support
        volatile storage."

OBJECT diffServClfrStorage
    SYNTAX StorageType { volatile(2) }
    DESCRIPTION
        "An implementation is only required to support
        volatile storage."

OBJECT diffServClfrElementStorage
    SYNTAX StorageType { volatile(2) }
    DESCRIPTION
        "An implementation is only required to support
        volatile storage."

OBJECT diffServMultiFieldClfrStorage
    SYNTAX StorageType { volatile(2) }
    DESCRIPTION
        "An implementation is only required to support
        volatile storage."

OBJECT diffServActionStorage
    SYNTAX StorageType { volatile(2) }
    DESCRIPTION
        "An implementation is only required to support
        volatile storage."

OBJECT diffServCountActStorage
    SYNTAX StorageType { volatile(2) }
    DESCRIPTION
        "An implementation is only required to support
        volatile storage."

OBJECT diffServAlgDropStorage
    SYNTAX StorageType { volatile(2) }
    DESCRIPTION
        "An implementation is only required to support
        volatile storage."

OBJECT diffServAlgDropType
    SYNTAX INTEGER { alwaysDrop(5) }
    DESCRIPTION
        "This object is only used to provide packet
        filtering. Implementations need not support other
        values of this enumeration."
```

```
MODULE -- docsDev
```

```
MANDATORY-GROUPS {  
    docsDevBaseGroup,  
    docsDevBaseIgmpGroup,  
    docsDevBaseMaxCpeGroup,  
    docsDevSoftwareGroupV2,  
    docsDevServerGroupV2,  
    docsDevEventGroupV2,  
    docsDevFilterLLCGroup  
}
```

```
-- conditionally mandatory groups
```

```
GROUP docsDevInetCpeGroup  
    DESCRIPTION  
        "This group is optional in Cable Modems."
```

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

```
OBJECT docsDevSTPControl  
    SYNTAX INTEGER { noStFilterBpdu(2) }  
    MIN-ACCESS read-only  
    DESCRIPTION  
        "It is compliant to implement this object as read-only.  
        Devices need only support noStFilterBpdu(2)."
```

```
OBJECT docsDevIgmpModeControl  
    SYNTAX INTEGER { passive(1) }  
    MIN-ACCESS read-only  
    DESCRIPTION  
        "It is compliant to implement this object as read-only.  
        Devices need only support passive(1)."
```

```
OBJECT docsDevSwServerAddressType  
    SYNTAX InetAddressType { ipv4(1) }  
    DESCRIPTION  
        "An implementation is only required to support IPv4  
        addresses."
```

```
OBJECT docsDevSwServerAddress  
    SYNTAX InetAddress (SIZE(4))  
    DESCRIPTION  
        "An implementation is only required to support IPv4  
        addresses."
```

```
OBJECT docsDevServerDhcpAddressType
    SYNTAX InetAddressType { ipv4(1) }
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."

OBJECT docsDevServerDhcpAddress
    SYNTAX  InetAddress (SIZE(4))
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."

OBJECT docsDevServerTimeAddressType
    SYNTAX InetAddressType { ipv4(1) }
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."

OBJECT docsDevServerTimeAddress
    SYNTAX  InetAddress (SIZE(4))
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."

OBJECT docsDevServerConfigTftpAddressType
    SYNTAX InetAddressType { ipv4(1) }
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."

OBJECT docsDevServerConfigTftpAddress
    SYNTAX  InetAddress (SIZE(4))
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."

OBJECT docsDevEvReporting
    MIN-ACCESS read-only
    DESCRIPTION
        "It is compliant to implement this object as read-only.
        Devices need only support local(0)."
```

```
OBJECT docsDevEvSyslogAddressType
    SYNTAX InetAddressType { ipv4(1) }
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."
```

```
OBJECT docsDevEvSyslogAddress
    SYNTAX InetAddress (SIZE(4))
    DESCRIPTION
        "An implementation is only required to support IPv4
        addresses."

OBJECT docsDevSwServerTransportProtocol
    SYNTAX INTEGER { tftp(1) }
    DESCRIPTION
        "An implementation is only required to support TFTP
        software image downloads."

 ::= { docsDevCompliancesV2 1 }

docsDevCmtsCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for DOCSIS Cable Modem
        Termination Systems.

        This compliance statement applies to implementations
        of DOCSIS versions that are not IPv6 capable."

MODULE -- docsDev

-- conditionally mandatory groups

GROUP docsDevBaseGroup
    DESCRIPTION
        "Optional in Cable Modem Termination Systems."

GROUP docsDevBaseIgmpGroup
    DESCRIPTION
        "Optional in Cable Modem Termination Systems."

GROUP docsDevBaseMaxCpeGroup
    DESCRIPTION
        "This group MUST NOT be implemented in Cable Modem
        Termination Systems."

GROUP docsDevSoftwareGroupV2
    DESCRIPTION
        "Optional in Cable Modem Termination Systems."

GROUP docsDevServerGroupV2
    DESCRIPTION
        "This group MUST NOT be implemented in Cable Modem
        Termination Systems."
```

GROUP docsDevEventGroupV2  
DESCRIPTION  
"Optional in Cable Modem Termination Systems."

GROUP docsDevFilterLLCGroup  
DESCRIPTION  
"This group MUST NOT be implemented in Cable Modem Termination Systems. See the Subscriber Management MIB for similar CMTS capability."

GROUP docsDevInetCpeGroup  
DESCRIPTION  
"This group MUST NOT be implemented in Cable Modem Termination Systems. See the Subscriber Management MIB for similar CMTS capability."

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

OBJECT docsDevSTPControl  
SYNTAX INTEGER { noStFilterBpdu(2) }  
MIN-ACCESS read-only  
DESCRIPTION  
"It is compliant to implement this object as read-only.  
Devices need only support noStFilterBpdu(2)."

OBJECT docsDevIgmpModeControl  
SYNTAX INTEGER { passive(1) }  
MIN-ACCESS read-only  
DESCRIPTION  
"It is compliant to implement this object as read-only.  
Devices need only support passive(1)."

OBJECT docsDevSwServerAddressType  
SYNTAX InetAddressType { ipv4(1) }  
DESCRIPTION  
"An implementation is only required to support IPv4 addresses."

OBJECT docsDevSwServerAddress  
SYNTAX InetAddress (SIZE(4))  
DESCRIPTION  
"An implementation is only required to support IPv4 addresses."

OBJECT docsDevEvReporting

MIN-ACCESS read-only

DESCRIPTION

"It is compliant to implement this object as read-only.  
Devices need only support local(0)."

OBJECT docsDevEvSyslogAddressType

SYNTAX InetAddressType { ipv4(1) }

DESCRIPTION

"An implementation is only required to support IPv4  
addresses."

OBJECT docsDevEvSyslogAddress

SYNTAX InetAddress (SIZE(4))

DESCRIPTION

"An implementation is only required to support IPv4  
addresses."

OBJECT docsDevSwServerTransportProtocol

SYNTAX INTEGER { tftp(1) }

DESCRIPTION

"An implementation is only required to support TFTP  
software image downloads."

::= { docsDevCompliancesV2 2 }

docsDevBaseIgmpGroup OBJECT-GROUP

OBJECTS {

docsDevIgmpModeControl

}

STATUS current

DESCRIPTION

"An object providing cable device IGMP status and  
control."

::= { docsDevGroupsV2 1 }

docsDevBaseMaxCpeGroup OBJECT-GROUP

OBJECTS {

docsDevMaxCpe

}

STATUS current

DESCRIPTION

"An object providing management of the maximum number of  
CPEs permitted access through a cable modem."

::= { docsDevGroupsV2 2 }

docsDevNmAccessExtGroup OBJECT-GROUP

OBJECTS {

docsDevNmAccessTrapVersion

```
}
STATUS      deprecated
DESCRIPTION
    "An object, in addition to the objects in
    docsDevNmAccessGroup, for controlling access to
    SNMP objects on cable devices.

    This group is included in this MIB due to existing
    implementations of docsDevNmAccessTrapVersion in
    DOCSIS cable modems.

    This group has been deprecated because the object has
    been deprecated in favor of SNMPv3 and Coexistence
    MIBs."
 ::= { docsDevGroupsV2 3 }

docsDevSoftwareGroupV2 OBJECT-GROUP
    OBJECTS {
        docsDevSwFilename,
        docsDevSwAdminStatus,
        docsDevSwOperStatus,
        docsDevSwCurrentVers,
        docsDevSwServerAddressType,
        docsDevSwServerAddress,
        docsDevSwServerTransportProtocol
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects for controlling software
        downloads.  This group replaces docsDevSoftwareGroup."
 ::= { docsDevGroupsV2 4 }

docsDevServerGroupV2 OBJECT-GROUP
    OBJECTS {
        docsDevServerBootState,
        docsDevServerDhcpAddressType,
        docsDevServerDhcpAddress,
        docsDevServerTimeAddressType,
        docsDevServerTimeAddress,
        docsDevServerConfigTftpAddressType,
        docsDevServerConfigTftpAddress,
        docsDevServerConfigFile
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing status about server
        provisioning.  This group replaces docsDevServerGroup."
 ::= { docsDevGroupsV2 5 }
```

## docsDevEventGroupV2 OBJECT-GROUP

## OBJECTS {

docsDevEvControl,  
docsDevEvThrottleAdminStatus,  
docsDevEvThrottleThreshold,  
docsDevEvThrottleInterval,  
docsDevEvReporting,  
docsDevEvFirstTime,  
docsDevEvLastTime,  
docsDevEvCounts,  
docsDevEvLevel,  
docsDevEvId,  
docsDevEvText,  
docsDevEvSyslogAddressType,  
docsDevEvSyslogAddress,  
docsDevEvThrottleThresholdExceeded

}

STATUS current

## DESCRIPTION

"A collection of objects used to control and monitor events. This group replaces docsDevEventGroup. The event reporting mechanism, and more specifically docsDevEvReporting, can be used to take advantage of the event reporting features of RFC3413 and RFC3014."

::= { docsDevGroupsV2 6 }

## docsDevFilterLLCGroup OBJECT-GROUP

## OBJECTS {

docsDevFilterLLCUnmatchedAction,  
docsDevFilterLLCStatus,  
docsDevFilterLLCIfIndex,  
docsDevFilterLLCProtocolType,  
docsDevFilterLLCProtocol,  
docsDevFilterLLCMatches

}

STATUS current

## DESCRIPTION

"A collection of objects to specify link layer filters."

::= { docsDevGroupsV2 7 }

## docsDevInetCpeGroup OBJECT-GROUP

## OBJECTS {

docsDevCpeEnroll,  
docsDevCpeIpMax,  
docsDevCpeInetSource,  
docsDevCpeInetRowStatus

}

STATUS current

## DESCRIPTION

"A collection of objects used to control the number and specific values of Internet (e.g., IPv4 and IPv6) addresses allowed for associated Customer Premises Equipment (CPE)."

::= { docsDevGroupsV2 8 }

END

## 5. Acknowledgements

This document is a production of the IPCDN Working Group and is a revision of RFC 2669, "Cable Device Management Information Base for DOCSIS-Compliant Cable Modems and Cable Modem Termination Systems" [RFC2669]. Mike St. Johns and Guenter Roeck served well as the editors of previous versions of this MIB module.

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### 5.1. Revision Descriptions

This document contains the following revisions over RFC 2669:

- o All IPv4 address objects were either deprecated and replaced or mirrored with IPv6 objects, where appropriate, following the guidelines of RFC 4001 [RFC4001]. In particular, docsDevCpeInetTable was added, and the docsDevFilterGroup objects were deprecated in favor of the DiffServ MIB.
- o Objects that were obviated by SNMPv3 and the SNMP Coexistence MIBs have been deprecated; e.g., docsDevNmAccessTable.
- o A new object, docsDevIgmpModeControl, has been added to control passive versus active IGMP modem operation.
- o A new object, docsDevMaxCpe, has been added to report the maximum number of CPEs granted network access across the CM.
- o A new object, docsDevSwServerTransportProtocol, has been added to docsDevSoftware, and other object DESCRIPTIONs have been modified, to enable the use of either TFTP or HTTP for software downloads to the device.

- o A new object, docsDevEvThrottleThresholdExceeded, has been added to replace docsDevEvThrottleInhibited for simplification of event threshold management.
- o The docsDevEvReporting object has been modified to enable local logging to the internal volatile log, and not to the internal non-volatile log.
- o Minor updates to the description text have been made to a number of objects to clarify their meaning.
- o The compliance statements were updated to reflect current requirements (including making the docsDevCpe objects optional) and split between CM and CMTS devices.
- o Text was added to indicate support of the SNMP Notification MIB [RFC3413] and Notification Log MIB [RFC3014] modules.

## 6. Security Considerations

This MIB module relates to a system that will provide metropolitan public internet access. As such, improper manipulation of the objects represented by this MIB module may result in denial of service to a large number of end-users. In addition, manipulation of docsDevNmAccessTable, docsDevFilterLLCTable, docsDevFilterIpTable, docsDevFilterInetTable, and the elements of the docsDevCpe and docsDevCpeInetTable groups may allow an end-user to increase his or her service levels, spoof his or her IP addresses, change the permitted management stations, or affect other end-users in either a positive or negative manner.

It is recommended that the implementors prevent the "tiny fragment" and "overlapping fragment" attacks for the IP filtering tables in this MIB module, as discussed in [RFC1858] and [RFC3128]. Prevention of these attacks can be implemented with the following rules, when TCP source and/or destination port filtering is enabled:

- o Admit all packets with fragment offset  $\geq 2$ .
- o Discard all packets with fragment offset = 1, or with fragment offset = 0 AND fragment payload length  $< 16$ .
- o Apply filtering rules to all packets with fragment offset = 0.

This MIB module does not affect confidentiality of services on a cable modem system. [BPI] and [BPIPLUS] specify the implementation of the DOCSIS Baseline Privacy and Baseline Privacy Plus mechanisms for data transmission confidentiality.

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/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. These are the tables and objects and their sensitivity/vulnerability:

- o The use of docsDevNmAccessTable to specify management stations is considered only limited protection and does not protect against attacks that spoof the management station's IP address. The use of stronger mechanisms, such as SNMPv3 security, should be considered, where possible. Specifically, SNMPv3 USM [RFC3414] and VACM [RFC3415] MUST be used with any v3 agent that implements this MIB module.
- o The CM may have its software changed by the actions of the management system using a combination of the following objects: docsDevSwServer, docsDevSwFilename, docsDevSwAdminStatus, docsDevSwServerAddressType, docsDevSwServerAddress, and docsDevSwServerTransportProtocol. An improper software download may result in substantial vulnerabilities and the loss of the ability of the management system to control the cable modem. A cable device SHOULD implement the code verification mechanisms of [BPIPLUS] to verify the source and integrity of downloaded software images.
- o The device may be reset by setting docsDevResetNow = true(1). This causes the device to reload its configuration files, as well as to eliminate all previous non-persistent network management settings. As such, this may provide a vector for attacking the system.
- o Setting docsDevEvThrottleAdminStatus = unconstrained(1) (which is also the DEFVAL) may cause flooding of traps, which can disrupt network service. Additionally, docsDevThrottleThreshold and docsDevThrottleInterval could also be set to high values that may cause a disruption in service.
- o Setting docsDevDateTime to an arbitrary (incorrect) value would merely cause the device to record incorrect timestamps on many events/actions that rely on this object for reporting.
- o Setting docsDevEvControl to resetLog(1) will delete any event log history and could potentially impact debugging/troubleshooting efforts.
- o Setting docsDevEvSyslog.

- o Setting docsDevEvReporting to enable syslog reporting, along with a redirect of the syslog server could allow access to sensitive information on network devices. Modifying docsDevEvSyslog, docsDevEvSyslogAddressType, or docsDevEvSyslogAddress could allow a redirect of sensitive information.
- o Setting docsDevFilterLLCnmatchedAction or docsDevFilterIpDefault could cause significant changes to default traffic filtering on a device.
- o Setting docsDevCpeEnroll to any(2) could cause the docsDevFilterCPETable to be populated, which may not be the intended functionality.
- o Setting docsDevCpeIpMax to a value other than that intended by the MSO may allow a user to provision more devices than the MSO would like.
- o Setting values in the docsDevNmAccess table can potentially introduce a mechanism for users to use a local NMS device and manipulate other settings in the CM or CMTS.
- o Setting values in the docsDevFilterLLC and docsDevFilterIP tables can allow or deny access to certain devices that the MSO does not want.
- o Setting docsDevCpeStatus and docsDevCpeInetRowStatus may allow users to provision more devices than were intended by the MSO, or to provision different ones.

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 access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability:

- o Rows from docsDevNmAccessTable may provide sufficient information for attackers to spoof management stations that have management access to the device.
- o The docsDevSwCurrentVers object may provide hints as to the software vulnerabilities of the cable device.
- o The docsDevFilterLLCTable and docsDevFilterLLCTable may provide clues for attacking the cable device and other subscriber devices.

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. IANA Considerations

The MIB module defined in this document uses the following IANA-assigned OBJECT IDENTIFIER values, recorded in the SMI Numbers registry:

Descriptor	OBJECT IDENTIFIER	value
docsDevMIB	{ mib-2 69 }	

## 8. References

### 8.1. Normative 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 CM-SP-BPI+\_I12-050812", August 2005, <<http://www.cablemodem.com/specifications/>>, <<http://www.cablelabs.com/specifications/archives/>>.
- [ITU-T\_J.112] ITU-T Recommendation J.112 (3/98), "Transmission Systems for Interactive Cable Television Services, J.112, International Telecommunications Union", March 1998, <<http://www.itu.int/ITU-T/studygroups/com09/>>.
- [MTA-PROV] CableLabs, "PacketCable(TM) 1.5 Specification: MTA Device Provisioning PKT-SP-PROV1.5-I02-050812", August 2005, <<http://www.packetcable.com/specifications/>>, <<http://www.cablelabs.com/specifications/archives/>>.
- [OSSI1.0] SCTE Data Standards Subcommittee, "Data-Over-Cable Service Interface Specification: DOCSIS 1.0 Operations Support System Interface (OSSI), SCTE 22-3 2002", 2002, <<http://www.scte.org/standards/>>.
- [OSSI1.1] SCTE Data Standards Subcommittee, "DOCSIS 1.1 Part 3: Operations Support System Interface ANSI/SCTE 23-3 2005", 2005, <<http://www.scte.org/standards/>>.
- [OSSI2.0] CableLabs, "Data-Over-Cable Service Interface Specifications: Operations Support System Interface Specification SP-OSSIV2.0-I09-050812", August 2005, <<http://www.cablemodem.com/specifications/>>, <<http://www.cablelabs.com/specifications/archives/>>.
- [RFC1350] Sollins, K., "The TFTP Protocol (Revision 2)", STD 33, RFC 1350, July 1992.
- [RFC4502] Waldbusser, S., "Remote Network Monitoring Management Information Base Version 2", RFC 4502, May 2006.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder J., Case, J., Rose, M. and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.
- [RFC2616] Fielding, R., Gettys, J., Mogul, J., Frystyk, H., Masinter, L., Leach, P., and T. Berners-Lee, "Hypertext Transfer Protocol -- HTTP/1.1", RFC 2616, June 1999.
- [RFC2669] St. Johns, M., "DOCSIS Cable Device MIB Cable Device Management Information Base for DOCSIS compliant Cable Modems and Cable Modem Termination Systems", RFC 2669, August 1999.
- [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, June 2000.
- [RFC3014] Kavasseri, R., "Notification Log MIB", RFC 3014, November 2000.
- [RFC3289] Baker, F., Chan, K., and A. Smith, "Management Information Base for the Differentiated Services Architecture", RFC 3289, May 2002.
- [RFC3411] Harrington, D., Presuhn, R., and B. Wijnen, "An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks", STD 62, RFC 3411, December 2002.
- [RFC3413] Levi, D., Meyer, P., and B. Stewart, "Simple Network Management Protocol (SNMP) Applications", STD 62, RFC 3413, December 2002.
- [RFC3414] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", STD 62, RFC 3414, December 2002.

- [RFC3415] Wijnen, B., Presuhn, R., and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", STD 62, RFC 3415, December 2002.
- [RFC3418] Presuhn, R., "Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)", STD 62, RFC 3418, December 2002.
- [RFC3584] Frye, R., Levi, D., Routhier, S., and B. Wijnen, "Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework", BCP 74, RFC 3584, August 2003.
- [RFC868] Postel, J. and K. Harrenstien, "Time Protocol", STD 26, RFC 868, May 1983.
- [RFC4001] Daniele, M., Haberman, B., Routhier, S., and J. Schoenwaelder, "Textual Conventions for Internet Network Addresses", RFC 4001, February 2005.
- [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/>>.
- [RFI1.1] SCTE Data Standards Subcommittee, "DOCSIS 1.1 Part 1: Radio Frequency Interface ANSI/SCTE 23-1 2005", 2005, <<http://www.scte.org/standards/>>.
- [RFI2.0] CableLabs, "Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification SP-RFI2.0-I11-060602", June 2006, <<http://www.cablemodem.com/specifications/>>, <<http://www.cablelabs.com/specifications/archives/>>.

## 8.2. Informative References

- [RFC1858] Ziemba, G., Reed, D., and P. Traina, "Security Considerations r IP Fragment Filtering", RFC 1858, October 1995.
- [RFC1945] Berners-Lee, T., Fielding, R., and H. Frystyk, "Hypertext Traner Protocol -- HTTP/1.0", RFC 1945, May 1996.
- [RFC3128] Miller, I., "Protection Against a Variant of the Tiny Fragment Attack (RFC 1858)", RFC 3128, June 2001.

- [RFC3164] Lonvick, C., "The BSD Syslog Protocol", RFC 3164, August 2001.
- [RFC3617] Lear, E., "Uniform Resource Identifier (URI) Scheme and Applicability Statement for the Trivial File Transfer Protocol (TFTP)", RFC 3617, October 2003.
- [RFC4547] Ahmad, A. and G. Nakanishi, "Event Notification Management Information Base for Data over Cable Service Interface Specifications (DOCSIS) Compliant Cable Modems and Cable Modem Termination Systems", RFC 4547, June 2006.
- [RFC1224] Steinberg, L., "Techniques for managing asynchronously generated alerts", RFC 1224, May 1991.
- [RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.
- [RFC4036] Sawyer, W., "Management Information Base for Data Over Cable Service Interface Specification (DOCSIS) Cable Modem Termination Systems for Subscriber Management", RFC 4036, April 2005.
- [RFC4323] Patrick, M. and W. Murwin, "Data Over Cable System Interface Specification Quality of Service Management Information Base (DOCSIS-QoS MIB)", RFC 4323, January 2006.
- [MULPI3.0] CableLabs, "Data-Over-Cable Service Interface Specifications: DOCSIS 3.0 MAC and Upper Layer Protocols Interface Specification CM-SP-MULPIv3.0-I01-060804", August 2006,  
<<http://www.cablemodem.com/specifications/>>,  
<<http://www.cablelabs.com/specifications/archives/>>.

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