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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

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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.

- 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).

- 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.

- The docsDevSoftwareGroup, updated by the docsDevSoftwareGroupV2, provides information for network-downloadable software upgrades. See "Handling of Software Upgrades", below.

- The docsDevServerGroup, updated by the docsDevServerGroupV2, provides information about the progress of the interaction between the CM or CMTS and various provisioning servers.

- 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.

- 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.

- 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

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

- the download is incomplete;
- the file contents are incomplete or damaged; or
- 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.

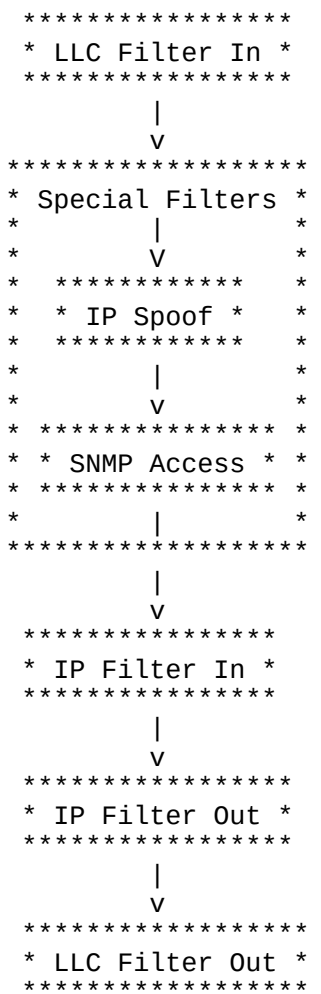
See "Techniques for Managing Asynchronously Generated Alerts" [RFC1224] for additional technical motivations.

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.



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 24.0.16/255.255.255.0 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"
            CONTACT-INFO
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                            richard_woundy@cable.comcast.com
                            Jean-Francois Mule,
                            jf.mule@cablelabs.com"

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

```
            and cable-modem termination systems.

            Copyright (C) The IETF Trust (2006).  This version
            of this MIB module was published in RFC 4639; for full
            legal notices see the RFC itself."

        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
              maxmium 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 OSSI 1.1 Specification, Appendix H and
                 DOCSIS OSSI 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 OSSI 1.1 Specification, Section 3.3.4.1. and
                DOCSIS OSSI 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:

- 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.

- Objects that were obviated by SNMPv3 and the SNMP Coexistence MIBs have been deprecated; e.g., docsDevNmAccessTable.

- A new object, docsDevIgmpModeControl, has been added to control passive versus active IGMP modem operation.

- A new object, docsDevMaxCpe, has been added to report the maximum number of CPEs granted network access across the CM.

- 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.

- A new object, docsDevEvThrottleThresholdExceeded, has been added to replace docsDevEvThrottleInhibited for simplification of event threshold management.

- The docsDevEvReporting object has been modified to enable local logging to the internal volatile log, and not to the internal non-volatile log.

- Minor updates to the description text have been made to a number of objects to clarify their meaning.

- The compliance statements were updated to reflect current requirements (including making the docsDevCpe objects optional) and split between CM and CMTS devices.

- 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:

- Admit all packets with fragment offset >= 2.

- Discard all packets with fragment offset = 1, or with fragment offset = 0 AND fragment payload length < 16.

- 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:

- 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.

- 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.

- 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.

- 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.

- 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.

- Setting docsDevEvControl to resetLog(1) will delete any event log history and could potentially impact debugging/troubleshooting efforts.

- Setting docsDevEvSyslog.

- 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.

- Setting docsDevFilterLLCnmatchedAction or docsDevFilterIpDefault could cause significant changes to default traffic filtering on a device.

- Setting docsDevCpeEnroll to any(2) could cause the docsDevFilterCPETable to be populated, which may not be the intended functionality.

- 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.

- 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.

- Setting values in the docsDevFilterLLC and docsDevFilterIP tables can allow or deny access to certain devices that the MSO does not want.

- 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:

- Rows from docsDevNmAccessTable may provide sufficient information for attackers to spoof management stations that have management access to the device.

- The docsDevSwCurrentVers object may provide hints as to the software vulnerabilities of the cable device.

- 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 Applicbility 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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