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Event Notification Management Information Base for Data over Cable Service Interface Specifications (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 event notification management of Data Over Cable Service Interface Specification (DOCSIS) compliant Cable Modems and Cable Modem Termination Systems. This MIB is defined as an extension to the DOCSIS Cable Device MIB.

This memo specifies a MIB module in a manner that is compliant to the Structure of Management Information Version 2 (SMIv2). The set of objects is consistent with the SNMP framework and existing SNMP standards.

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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 [16].

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 [2], STD 58, RFC 2579 [3] and STD 58, RFC 2580 [4].

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. BPI - Baseline Privacy Interface

A mechanism for providing data privacy over the HFC network in DOCSIS 1.0 systems [8].

2.2. BPI - Baseline Privacy Plus Interface

A mechanism that extends the Baseline Privacy Interface with the addition of CM authentication over the HFC network in DOCSIS 1.1/2.0 systems and beyond [9].

2.3. 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.

2.4. CM - Cable Modem

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

2.5. CMTS - Cable Modem Termination System

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

2.6. DOCSIS

DOCSIS stands for "Data-over-Cable Service Interface Specifications" and refers to the ITU-T J.112 Annex B standard for cable modem systems [10], [13] commonly known as DOCSIS 1.0. The DOCSIS 1.1 specification is an extension of DOCSIS 1.0, with new features to support quality of service, fragmentation, and requirements for European cable plants [14].

DOCSIS 2.0 [15] builds upon DOCSIS 1.1 and provides all of the features and functionality that DOCSIS 1.1 provides. In addition, it provides some significant enhancements in upstream capacity over DOCSIS 1.1, such as 30.72 Mbps maximum upstream channel capacity, Synchronous-Code Division Multiple Access (CDMA) operation, increased robustness to upstream noise and channel impairments, Enhanced Reed-Solomon error correction, and Trellis Coded Modulation.

2.7. Downstream

The direction from the CMTS to the CM.

2.8. Head-end

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

2.9. MAC Packet

A term referring to DOCSIS Protocol Data Unit (PDU).

2.10. RF

A term referring to Radio Frequency.

2.11. SID

A term referring to DOCSIS Service ID. The SID identifies a particular upstream bandwidth allocation and class-of-service management for DOCSIS, and identifies a particular bidirectional security association for BPI.

2.12. TLV

TLV stands for Type/Length/Value. TLV is an encoding method consisting of three fields. The first field indicates the type of element, the second field indicates the length of the element, and the third field contains the element's value.

2.13. Upstream

The direction from the CM to the CMTS.

3. Overview

Offering High Speed Internet Service in the cable industry has become extremely successful. DOCSIS devices are being deployed at a rate of multiple thousands per day. Although operators are enjoying successful deployment, they are also facing the challenge of properly managing deployed devices. Operators are using Simple Network Management Protocol, a set of Management Information Base (MIB) required by DOCSIS, and SNMP Notifications to manage deployed DOCSIS devices. The usage of SNMP Notification for event reporting is becoming more popular as an effective and efficient method for network monitoring.

Unfortunately, only a minimal set of SNMP Notifications is currently available. This notification MIB, in conjunction with [11] and [12], provides a minimum set of standard DOCSIS Notifications that DOCSIS devices SHOULD support to enable successful management of DOCSIS devices and networks.

This document defines a set of objects required for the event notification management of DOCSIS-compliant Cable Modems (CMs) and Cable Modem Termination Systems (CMTSs). The MIB module is derived from the DOCSIS [11] and [12].

Appendix H of [11] defines all DOCSIS 1.1 required events, and Appendix D of [12] does that for DOCSIS 2.0. The notifications specified in this document are used to notify these events via SNMP.

In this document, the key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" are to be interpreted as described in RFC 2119 [1].

3.1. Structure of the MIB

This DOCS-IETF-CABLE-DEVICE-NOTIFICATION-MIB was designed to extend the RFC2669 [5] notification module.

Two groups of SNMP notification objects are defined in this document. One group defines notifications for cable modem events, and the other group defines notifications for cable modem termination system events.

DOCSIS defines numerous events, and each event is assigned to a functional category. This MIB defines a notification object for each functional category. The varbinding list of each notification includes information about the event that occurred on the device.

4. Definitions

The MIB module defined here IMPORTs from SNMPv2-SMI [2], SNMPv2-CONF [3], DOCS-CABLE-DEVICE-MIB [5], DOCS-IF-MIB [6], and IF-MIB [7].

```
DOCS-IETF-CABLE-DEVICE-NOTIFICATION-MIB DEFINITIONS ::= BEGIN

  IMPORTS
        MODULE-IDENTITY,
        OBJECT-TYPE,
        NOTIFICATION-TYPE,
        mib-2
              FROM SNMPv2-SMI -- RFC 2578
        MODULE-COMPLIANCE,
```

```
            OBJECT-GROUP,
            NOTIFICATION-GROUP
                  FROM SNMPv2-CONF -- RFC 2580

            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            docsDevSwFilename,
            docsDevSwServer,
            docsDevServerDhcp,
            docsDevServerTime
                  FROM DOCS-CABLE-DEVICE-MIB -- RFC 2669

            docsIfCmCmtsAddress,
            docsIfCmtsCmStatusMacAddress,
            docsIfDocsisBaseCapability,
            docsIfCmStatusDocsisOperMode,
            docsIfCmStatusModulationType,
            docsIfCmtsCmStatusDocsisRegMode,
            docsIfCmtsCmStatusModulationType
                  FROM DOCS-IF-MIB -- RFC 4546

            ifPhysAddress
                  FROM IF-MIB;  -- RFC 2863

      docsDevNotifMIB MODULE-IDENTITY

            LAST-UPDATED    "200605240000Z" -- May 24, 2006
            ORGANIZATION    "IETF IP over Cable Data Network
                             Working Group"

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```
                Subscribe: http://www.ietf.org/mailman/listinfo/ipcdn
                Archive: ftp://ftp.ietf.org/ietf-mail-archive/ipcdn
                Co-chairs: Richard Woundy,
                             richard_woundy@cable.comcast.com
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            DESCRIPTION
                "The Event Notification MIB is an extension of the
                CABLE DEVICE MIB.  It defines various notification
                objects for both cable modem and cable modem termination
                systems.  Two groups of SNMP notification objects are
                defined.  One group is for notifying cable modem events,
                and one group is for notifying cable modem termination
                system events.

                DOCSIS defines numerous events, and each event is
                assigned to a functional category.  This MIB defines
                a notification object for each functional category.
                The varbinding list of each notification includes
                information about the event that occurred on the
                device.

                Copyright (C) The Internet Society (2006).  This version
                of this MIB module is part of RFC 4547; see the RFC
                itself for full legal notices."

            REVISION "200605240000Z" -- May 24, 2006
            DESCRIPTION
                "Initial version, published as RFC 4547."
            ::= { mib-2 132 }

    docsDevNotifControl OBJECT IDENTIFIER ::= { docsDevNotifMIB 1}
    docsDevCmNotifs OBJECT IDENTIFIER ::= { docsDevNotifMIB 2 0 }
    docsDevCmtsNotifs OBJECT IDENTIFIER ::= { docsDevNotifMIB 3 0 }

    docsDevCmNotifControl OBJECT-TYPE
        SYNTAX BITS {
            cmInitTLVUnknownNotif( 0),
            cmDynServReqFailNotif( 1),
            cmDynServRspFailNotif( 2),
            cmDynServAckFailNotif( 3),
            cmBpiInitNotif( 4),
            cmBPKMNotif( 5),
            cmDynamicSANotif( 6),
            cmDHCPFailNotif( 7),
            cmSwUpgradeInitNotif( 8),
            cmSwUpgradeFailNotif( 9),
            cmSwUpgradeSuccessNotif( 10),
```

```
            cmSwUpgradeCVCNotif( 11),
            cmTODFailNotif( 12),
            cmDCCReqFailNotif( 13),
            cmDCCRspFailNotif( 14),
            cmDCCAckFailNotif( 15)
        }
        MAX-ACCESS read-write

        STATUS current
        DESCRIPTION
            "The object is used to enable specific CM notifications.
            For example, if the first bit is set, then
            docsDevCmInitTLVUnknownNotif is enabled.  If it is not set,
            the notification is disabled.  Note that notifications are
            also under the control of the MIB modules defined in
            RFC3413.

            If the device is rebooted,the value of this object SHOULD
            revert to the default value.
           "
        DEFVAL { {} }
        ::= { docsDevNotifControl 1 }

    docsDevCmtsNotifControl OBJECT-TYPE
        SYNTAX BITS {
            cmtsInitRegReqFailNotif( 0),
            cmtsInitRegRspFailNotif( 1),
            cmtsInitRegAckFailNotif( 2),
            cmtsDynServReqFailNotif( 3),
            cmtsDynServRspFailNotif( 4),
            cmtsDynServAckFailNotif( 5),
            cmtsBpiInitNotif( 6),
            cmtsBPKMNotif( 7),
            cmtsDynamicSANotif( 8),
            cmtsDCCReqFailNotif( 9),
            cmtsDCCRspFailNotif( 10),
            cmtsDCCAckFailNotif( 11)
        }
        MAX-ACCESS read-write
        STATUS current
        DESCRIPTION
            "The object is used to enable specific CMTS notifications.
            For example, if the first bit is set, then
            docsDevCmtsInitRegRspFailNotif is enabled.  If it is not set,
            the notification is disabled.  Note that notifications are
            also under the control of the MIB modules defined in
            RFC3413.
```

```
            If the device is rebooted,the value of this object SHOULD
            revert to the default value.
           "
        DEFVAL { {} }
        ::= { docsDevNotifControl 2 }

    docsDevCmInitTLVUnknownNotif NOTIFICATION-TYPE
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            ifPhysAddress,
            docsIfCmCmtsAddress,
            docsIfDocsisBaseCapability,
            docsIfCmStatusDocsisOperMode,
            docsIfCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
            "Notification to indicate that an unknown TLV was
              encountered during the TLV parsing process.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
               event.
             - docsDevEvId: the unique identifier of the event that
               occurred.
             - docsDevEvText: a textual description of the event.
             - ifPhysAddress: the MAC address of the cable
               interface of this cable modem.
             - docsIfCmCmtsAddress: the MAC address of the CMTS
               to which the CM is connected (if there is a cable
               card/interface in the CMTS, then it is actually the
               MAC address of the cable interface to which it is
               connected).
             - docsIfDocsisBaseCapability: the highest
               version of the DOCSIS specification (1.0, 1.1, 2.0)
               that the device is capable of supporting.
             - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
               that the CM is operating in.
             - docsIfCmStatusModulationType: the upstream modulation
               methodology used by the CM.
            "
        ::= { docsDevCmNotifs 1 }
```

```
   docsDevCmDynServReqFailNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           ifPhysAddress,
           docsIfCmCmtsAddress,
           docsIfDocsisBaseCapability,
           docsIfCmStatusDocsisOperMode,
           docsIfCmStatusModulationType
       }
       STATUS current
       DESCRIPTION

           "A notification to report the failure of a dynamic service
            request during the dynamic services process.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - ifPhysAddress: the MAC address of the cable
              interface of this cable modem.
            - docsIfCmCmtsAddress: the MAC address of the CMTS
              to which the CM is connected to (if there is a cable
              card/interface in the CMTS, then it is actually the
              MAC address of the cable interface to which it is
              connected).
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
              that the CM is operating in.
            - docsIfCmStatusModulationType: the upstream modulation
              methodology used by the CM.
           "
       ::= { docsDevCmNotifs 2 }

   docsDevCmDynServRspFailNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           ifPhysAddress,
```

```
            docsIfCmCmtsAddress,
            docsIfDocsisBaseCapability,
            docsIfCmStatusDocsisOperMode,
            docsIfCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
            " A notification to report the failure of a dynamic service
             response during the dynamic services process.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
               event.
             - docsDevEvId: the unique identifier of the event that
               occurred.
             - docsDevEvText: a textual description of the event.
             - ifPhysAddress: the MAC address of the cable
               interface of this cable modem.
             - docsIfCmCmtsAddress: the MAC address of the CMTS
               to which the CM is connected (if there is a cable
               card/interface in the CMTS, then it is actually the
               MAC address of the cable interface to which it is
               connected).
             - docsIfDocsisBaseCapability: the highest
               version of the DOCSIS specification (1.0, 1.1, 2.0)
               that the device is capable of supporting.
             - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
               that the CM is operating in.
             - docsIfCmStatusModulationType: the upstream modulation
               methodology used by the CM.
            "
        ::= { docsDevCmNotifs 3}

    docsDevCmDynServAckFailNotif NOTIFICATION-TYPE
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            ifPhysAddress,
            docsIfCmCmtsAddress,
            docsIfDocsisBaseCapability,
            docsIfCmStatusDocsisOperMode,
            docsIfCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
```

```
            "A notification to report the failure of a dynamic service
             acknowledgement during the dynamic services process.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
               event.
             - docsDevEvId: the unique identifier of the event that
               occurred.
             - docsDevEvText: a textual description of the event.
             - ifPhysAddress: the MAC address of the cable
               interface of this cable modem.
             - docsIfCmCmtsAddress: the MAC address of the CMTS
               to which the CM is connected (if there is a cable
               card/interface in the CMTS, then it is actually the
               MAC address of the cable interface to which it is
               connected).
             - docsIfDocsisBaseCapability: the highest
               version of the DOCSIS specification (1.0, 1.1, 2.0)
               that the device is capable of supporting.
             - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
               that the CM is operating in.
             - docsIfCmStatusModulationType: the upstream modulation
               methodology used by the CM.
            "
        ::= { docsDevCmNotifs 4}

    docsDevCmBpiInitNotif NOTIFICATION-TYPE
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            ifPhysAddress,
            docsIfCmCmtsAddress,
            docsIfDocsisBaseCapability,
            docsIfCmStatusDocsisOperMode,
            docsIfCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
            "A notification to report the failure of a BPI
             initialization attempt during the registration process.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
```

```
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - ifPhysAddress: the MAC address of the cable
              interface of this cable modem.
            - docsIfCmCmtsAddress: the MAC address of the CMTS
              to which the CM is connected (if there is a cable
              card/interface in the CMTS, then it is actually the
              MAC address of the cable interface to which it is
              connected).
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
              that the CM is operating in.
            - docsIfCmStatusModulationType: the upstream modulation
              methodology used by the CM.
          "
      ::= { docsDevCmNotifs 5 }

   docsDevCmBPKMNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           ifPhysAddress,
           docsIfCmCmtsAddress,
           docsIfDocsisBaseCapability,
           docsIfCmStatusDocsisOperMode,
           docsIfCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           "A notification to report the failure of a Baseline
            Privacy Key Management (BPKM) operation.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - ifPhysAddress: the MAC address of the cable
              interface of this cable modem.
            - docsIfCmCmtsAddress: the MAC address of the CMTS
```

```
              to which the CM is connected (if there is a cable
              card/interface in the CMTS, then it is actually the
              MAC address of the cable interface to which it is
              connected).
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
              that the CM is operating in.
            - docsIfCmStatusModulationType: the upstream modulation
              methodology used by the CM.
          "
      ::= { docsDevCmNotifs 6 }

   docsDevCmDynamicSANotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           ifPhysAddress,
           docsIfCmCmtsAddress,
           docsIfDocsisBaseCapability,
           docsIfCmStatusDocsisOperMode,
           docsIfCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           "A notification to report the failure of a dynamic security
            association operation.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - ifPhysAddress: the MAC address of the cable
              interface of this cable modem.
            - docsIfCmCmtsAddress: the MAC address of the CMTS
              to which the CM is connected (if there is a cable
              card/interface in the CMTS, then it is actually the
              MAC address of the cable interface to which it is
              connected).
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
```

```
            - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
              that the CM is operating in.
            - docsIfCmStatusModulationType: the upstream modulation
              methodology used by the CM.
        "
    ::= { docsDevCmNotifs 7 }

docsDevCmDHCPFailNotif NOTIFICATION-TYPE
    OBJECTS {
        docsDevEvLevel,
        docsDevEvId,
        docsDevEvText,
        ifPhysAddress,
        docsIfCmCmtsAddress,
        docsDevServerDhcp,
        docsIfDocsisBaseCapability,
        docsIfCmStatusDocsisOperMode,
        docsIfCmStatusModulationType
    }
    STATUS current
    DESCRIPTION
        "A notification to report the failure of a DHCP operation.

         This notification sends additional information about
         the event by including the following objects in its
         varbinding list.
         - docsDevEvLevel: the priority level associated with the
           event.
         - docsDevEvId: the unique identifier of the event that
           occurred.
         - docsDevEvText: a textual description of the event.
         - ifPhysAddress: the MAC address of the cable
           interface of this cable modem.
         - docsIfCmCmtsAddress: the MAC address of the CMTS
           to which the CM is connected (if there is a cable
           card/interface in the CMTS, then it is actually the
           MAC address of the cable interface to which it is
           connected).
         - docsDevServerDhcp: the IP address of the DHCP server.
         - docsIfDocsisBaseCapability: the highest
           version of the DOCSIS specification (1.0, 1.1, 2.0)
           that the device is capable of supporting.
         - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
           that the CM is operating in.
         - docsIfCmStatusModulationType: the upstream modulation
           methodology used by the CM.
        "
    ::= { docsDevCmNotifs 8 }
```

```
   docsDevCmSwUpgradeInitNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           ifPhysAddress,
           docsIfCmCmtsAddress,
           docsDevSwFilename,
           docsDevSwServer,
           docsIfDocsisBaseCapability,
           docsIfCmStatusDocsisOperMode,
           docsIfCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           "A notification to indicate that a software upgrade
            has been initiated on the device.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - ifPhysAddress: the MAC address of the cable
              interface of this cable modem.
            - docsIfCmCmtsAddress: the MAC address of the CMTS
              to which the CM is connected (if there is a cable
              card/interface in the CMTS, then it is actually the
              MAC address of the cable interface to which it is
              connected).
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
              that the CM is operating in.
            - docsIfCmStatusModulationType: the upstream modulation
              methodology used by the CM.
           "
       ::= { docsDevCmNotifs 9 }

   docsDevCmSwUpgradeFailNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
```

```
            ifPhysAddress,
            docsIfCmCmtsAddress,
            docsDevSwFilename,
            docsDevSwServer,
            docsIfDocsisBaseCapability,
            docsIfCmStatusDocsisOperMode,
            docsIfCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
            "A notification to report the failure of a software upgrade
             attempt.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
               event.
             - docsDevEvId: the unique identifier of the event that
               occurred.
             - docsDevEvText: a textual description of the event.
             - ifPhysAddress: the MAC address of the cable
               interface of this cable modem.
             - docsIfCmCmtsAddress: the MAC address of the CMTS
               to which the CM is connected (if there is a cable
               card/interface in the CMTS, then it is actually the
               MAC address of the cable interface to which it is
               connected).
             - docsDevSwFilename: the software image file name
             - docsDevSwServer: the IP address of the server that
               the image is retrieved from.
             - docsIfDocsisBaseCapability: the highest
               version of the DOCSIS specification (1.0, 1.1, 2.0)
               that the device is capable of supporting.
             - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
               that the CM is operating in.
             - docsIfCmStatusModulationType: the upstream modulation
               methodology used by the CM.
            "
        ::= { docsDevCmNotifs 10 }

    docsDevCmSwUpgradeSuccessNotif NOTIFICATION-TYPE
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            ifPhysAddress,
            docsIfCmCmtsAddress,
```

```
            docsDevSwFilename,
            docsDevSwServer,
            docsIfDocsisBaseCapability,
            docsIfCmStatusDocsisOperMode,
            docsIfCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
            "A notification to report the software upgrade success
             status.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
               event.
             - docsDevEvId: the unique identifier of the event that
               occurred.
             - docsDevEvText: a textual description of the event.
             - ifPhysAddress: the MAC address of the cable
               interface of this cable modem.
             - docsIfCmCmtsAddress: the MAC address of the CMTS
               to which the CM is connected (if there is a cable
               card/interface in the CMTS, then it is actually the
               MAC address of the cable interface to which it is
               connected).
             - docsDevSwFilename: the software image file name
             - docsDevSwServer: the IP address of the server that
               the image is retrieved from.
             - docsIfDocsisBaseCapability: the highest
               version of the DOCSIS specification (1.0, 1.1, 2.0)
               that the device is capable of supporting.
             - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
               that the CM is operating in.
             - docsIfCmStatusModulationType: the upstream modulation
               methodology used by the CM.
            "
        ::= { docsDevCmNotifs 11 }

    docsDevCmSwUpgradeCVCFailNotif NOTIFICATION-TYPE
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            ifPhysAddress,
            docsIfCmCmtsAddress,
            docsIfDocsisBaseCapability,
            docsIfCmStatusDocsisOperMode,
```

```
            docsIfCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
            "A notification to report that the verification of the
             code file has failed during a secure software upgrade
             attempt.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
               event.
             - docsDevEvId: the unique identifier of the event that
               occurred.
             - docsDevEvText: a textual description of the event.
             - ifPhysAddress: the MAC address of the cable
               interface of this cable modem.
             - docsIfCmCmtsAddress: the MAC address of the CMTS
               to which the CM is connected (if there is a cable
               card/interface in the CMTS, then it is actually the
               MAC address of the cable interface to which it is
               connected).
             - docsIfDocsisBaseCapability: the highest
               version of the DOCSIS specification (1.0, 1.1, 2.0)
               that the device is capable of supporting.
             - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
               that the CM is operating in.
             - docsIfCmStatusModulationType: the upstream modulation
               methodology used by the CM.
            "
        ::= { docsDevCmNotifs 12 }

    docsDevCmTODFailNotif NOTIFICATION-TYPE
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            ifPhysAddress,
            docsIfCmCmtsAddress,
            docsDevServerTime,
            docsIfDocsisBaseCapability,
            docsIfCmStatusDocsisOperMode,
            docsIfCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
            "A notification to report the failure of a time of day
```

```
            operation.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - ifPhysAddress: the MAC address of the cable
              interface of this cable modem.
            - docsIfCmCmtsAddress: the MAC address of the CMTS
              to which the CM is connected (if there is a cable
              card/interface in the CMTS, then it is actually the
              MAC address of the cable interface to which it is
              connected).
            - docsDevServerTime: the IP address of the time server.
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
              that the CM is operating in.
            - docsIfCmStatusModulationType: the upstream modulation
              methodology used by the CM.
          "
      ::= { docsDevCmNotifs 13 }

   docsDevCmDCCReqFailNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           ifPhysAddress,
           docsIfCmCmtsAddress,
           docsIfDocsisBaseCapability,
           docsIfCmStatusDocsisOperMode,
           docsIfCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           " A notification to report the failure of a dynamic channel
            change request during the dynamic channel change process
            on the CM.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
```

```
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - ifPhysAddress: the MAC address of the cable
              interface of this cable modem.
            - docsIfCmCmtsAddress: the MAC address of the CMTS
              to which the CM is connected (if there is a cable
              card/interface in the CMTS, then it is actually the
              MAC address of the cable interface to which it is
              connected).
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
              that the CM is operating in.
            - docsIfCmStatusModulationType: the upstream modulation
              methodology used by the CM.
          "
      ::= { docsDevCmNotifs 14 }

   docsDevCmDCCRspFailNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           ifPhysAddress,
           docsIfCmCmtsAddress,
           docsIfDocsisBaseCapability,
           docsIfCmStatusDocsisOperMode,
           docsIfCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           "A notification to report the failure of a dynamic channel
            change response during the dynamic channel
            change process on the CM.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - ifPhysAddress: the MAC address of the cable
```

```
              interface of this cable modem.
            - docsIfCmCmtsAddress: the MAC address of the CMTS
              to which the CM is connected (if there is a cable
              card/interface in the CMTS, then it is actually the
              MAC address of the cable interface to which it is
              connected).
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
              that the CM is operating in.
            - docsIfCmStatusModulationType: the upstream modulation
              methodology used by the CM.
          "
      ::= { docsDevCmNotifs 15 }

   docsDevCmDCCAckFailNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           ifPhysAddress,
           docsIfCmCmtsAddress,
           docsIfDocsisBaseCapability,
           docsIfCmStatusDocsisOperMode,
           docsIfCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           "A notification to report the failure of a dynamic channel
            change acknowledgement during the dynamic channel
            change process on the CM.

            This notification sends additional information about
            the event by including the following objects in its

            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - ifPhysAddress: the MAC address of the cable
              interface of this cable modem.
            - docsIfCmCmtsAddress: the MAC address of the CMTS
              to which the CM is connected (if there is a cable
              card/interface in the CMTS, then it is actually the
              MAC address of the cable interface to which it is
```

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              connected).
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmStatusDocsisOperMode: the QOS level (1.0, 1.1)
              that the CM is operating in.
            - docsIfCmtsCmStatusModulationType the upstream modulation
              methodology used by the CM.
          "
      ::= { docsDevCmNotifs 16}

   docsDevCmtsInitRegReqFailNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           docsIfCmtsCmStatusMacAddress,
           ifPhysAddress,
           docsIfCmtsCmStatusDocsisRegMode,
           docsIfDocsisBaseCapability,
           docsIfCmtsCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           "A notification to report the failure of a registration
            request from a CM during the CM initialization
            process that was detected on the CMTS.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
              with which this notification is associated.
            - ifPhysAddress: the MAC address of the CMTS
              (if there is a cable card/interface in the CMTS,
              then it is actually the MAC address of the cable
              interface that connected to the CM) cable interface
              connected to the CM.
            - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
              that the reporting CM is operating in.
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
```

```
            - docsIfCmtsCmStatusModulationType: the upstream
              modulation methodology used by the CM.
          "
      ::= { docsDevCmtsNotifs 1 }

   docsDevCmtsInitRegRspFailNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           docsIfCmtsCmStatusMacAddress,
           ifPhysAddress,
           docsIfCmtsCmStatusDocsisRegMode,
           docsIfDocsisBaseCapability,
           docsIfCmtsCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           "A notification to report the failure of a registration
            response during the CM initialization
            process that was detected by the CMTS.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
              with which this notification is associated.
            - ifPhysAddress: the MAC address of the CMTS
              (if there is a cable card/interface in the CMTS,
              then it is actually the MAC address of the cable
              interface that connected to the CM) cable interface
              connected to the CM.
            - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
              that the reporting CM is operating in.
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmtsCmStatusModulationType: the upstream
              modulation methodology used by the CM.
           "
       ::= { docsDevCmtsNotifs 2 }

   docsDevCmtsInitRegAckFailNotif NOTIFICATION-TYPE
```

```
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            docsIfCmtsCmStatusMacAddress,
            ifPhysAddress,
            docsIfCmtsCmStatusDocsisRegMode,
            docsIfDocsisBaseCapability,
            docsIfCmtsCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
            "A notification to report the failure of a registration
             acknowledgement from the CM during the CM
             initialization process that was detected by the CMTS.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
               event.
             - docsDevEvId: the unique identifier of the event that
               occurred.
             - docsDevEvText: a textual description of the event.
             - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
               with which this notification is associated.
             - ifPhysAddress: the MAC address of the CMTS
               (if there is a cable card/interface in the CMTS,
               then it is actually the MAC address of the cable
               interface that connected to the CM) cable interface
               connected to the CM.
             - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
               that the reporting CM is operating in.
             - docsIfDocsisBaseCapability: the highest
               version of the DOCSIS specification (1.0, 1.1, 2.0)
               that the device is capable of supporting.
             - docsIfCmtsCmStatusModulationType: the upstream
               modulation methodology used by the CM.
            "
        ::= { docsDevCmtsNotifs 3 }

    docsDevCmtsDynServReqFailNotif NOTIFICATION-TYPE
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            docsIfCmtsCmStatusMacAddress,
            ifPhysAddress,
```

```
            docsIfCmtsCmStatusDocsisRegMode,
            docsIfDocsisBaseCapability,
            docsIfCmtsCmStatusModulationType
         }
        STATUS current
        DESCRIPTION
            "A notification to report the failure of a dynamic service
             request during the dynamic services process
             that was detected by the CMTS.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
               event.
             - docsDevEvId: the unique identifier of the event that
               occurred.
             - docsDevEvText: a textual description of the event.
             - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
               with which this notification is associated.
             - ifPhysAddress: the MAC address of the CMTS
               (if there is a cable card/interface in the CMTS,
               then it is actually the MAC address of the cable
               interface that connected to the CM) cable interface
               connected to the CM.
             - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
               that the reporting CM is operating in.
             - docsIfDocsisBaseCapability: the highest
               version of the DOCSIS specification (1.0, 1.1, 2.0)
               that the device is capable of supporting.
             - docsIfCmtsCmStatusModulationType: the upstream
               modulation methodology used by the CM.
            "
        ::= { docsDevCmtsNotifs 4 }

    docsDevCmtsDynServRspFailNotif NOTIFICATION-TYPE
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            docsIfCmtsCmStatusMacAddress,
            ifPhysAddress,
            docsIfCmtsCmStatusDocsisRegMode,
            docsIfDocsisBaseCapability,
            docsIfCmtsCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
```

```
            "A notification to report the failure of a dynamic service
             response during the dynamic services process
             that was detected by the CMTS.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
               event.
             - docsDevEvId: the unique identifier of the event that
               occurred.
             - docsDevEvText: a textual description of the event.
             - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
               with which this notification is associated.
             - ifPhysAddress: the MAC address of the CMTS
               (if there is a cable card/interface in the CMTS,
               then it is actually the MAC address of the cable
               interface that connected to the CM) cable interface
               connected to the CM.
             - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
               that the reporting CM is operating in.
             - docsIfDocsisBaseCapability: the highest
               version of the DOCSIS specification (1.0, 1.1, 2.0)
               that the device is capable of supporting.
             - docsIfCmtsCmStatusModulationType: the upstream
               modulation methodology used by the CM.
            "
        ::= { docsDevCmtsNotifs 5 }

    docsDevCmtsDynServAckFailNotif NOTIFICATION-TYPE
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            docsIfCmtsCmStatusMacAddress,
            ifPhysAddress,
            docsIfCmtsCmStatusDocsisRegMode,
            docsIfDocsisBaseCapability,
            docsIfCmtsCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
            "A notification to report the failure of a dynamic service
             acknowledgement during the dynamic services
             process that was detected by the CMTS.

             This notification sends additional information about
             the event by including the following objects in its
```

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            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
              with which this notification is associated.
            - ifPhysAddress: the MAC address of the CMTS
              (if there is a cable card/interface in the CMTS,
              then it is actually the MAC address of the cable
              interface that connected to the CM) cable interface
              connected to the CM.
            - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
              that the reporting CM is operating in.
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmtsCmStatusModulationType: the upstream
              modulation methodology used by the CM.
           "
       ::= { docsDevCmtsNotifs 6 }


   docsDevCmtsBpiInitNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           docsIfCmtsCmStatusMacAddress,
           ifPhysAddress,
           docsIfCmtsCmStatusDocsisRegMode,
           docsIfDocsisBaseCapability,
           docsIfCmtsCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           "A notification to report the failure of a BPI
            initialization attempt during the CM registration process
            that was detected by the CMTS.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
```

```
            - docsDevEvText: a textual description of the event.
            - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
              with which this notification is associated.
            - ifPhysAddress: the MAC address of the CMTS
              (if there is a cable card/interface in the CMTS,
              then it is actually the MAC address of the cable
              interface that connected to the CM) cable interface
              connected to the CM.
            - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
              that the reporting CM is operating in.
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmtsCmStatusModulationType: the upstream
              modulation methodology used by the CM.
          "
      ::= { docsDevCmtsNotifs 7 }

   docsDevCmtsBPKMNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           docsIfCmtsCmStatusMacAddress,
           ifPhysAddress,
           docsIfCmtsCmStatusDocsisRegMode,
           docsIfDocsisBaseCapability,
           docsIfCmtsCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           "A notification to report the failure of a BPKM operation
            that is detected by the CMTS.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
              with which this notification is associated.
            - ifPhysAddress: the MAC address of the CMTS
              (if there is a cable card/interface in the CMTS,
              then it is actually the MAC address of the cable
              interface that connected to the CM) cable interface
```

```
              connected to the CM.
            - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
              that the reporting CM is operating in.
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmtsCmStatusModulationType: the upstream
              modulation methodology used by the CM.
          "
      ::= { docsDevCmtsNotifs 8 }

   docsDevCmtsDynamicSANotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           docsIfCmtsCmStatusMacAddress,
           ifPhysAddress,
           docsIfCmtsCmStatusDocsisRegMode,
           docsIfDocsisBaseCapability,
           docsIfCmtsCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           "A notification to report the failure of a dynamic security
            association operation that is detected by the CMTS.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.

            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
              with which this notification is associated.
            - ifPhysAddress: the MAC address of the CMTS
              (if there is a cable card/interface in the CMTS,
              then it is actually the MAC address of the cable
              interface that connected to the CM) cable interface
              connected to the CM.
            - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
              that the reporting CM is operating in.
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
```

```
            - docsIfCmtsCmStatusModulationType: the upstream
              modulation methodology used by the CM.
          "
      ::= { docsDevCmtsNotifs 9 }

   docsDevCmtsDCCReqFailNotif NOTIFICATION-TYPE
       OBJECTS {
           docsDevEvLevel,
           docsDevEvId,
           docsDevEvText,
           docsIfCmtsCmStatusMacAddress,
           ifPhysAddress,
           docsIfCmtsCmStatusDocsisRegMode,
           docsIfDocsisBaseCapability,
           docsIfCmtsCmStatusModulationType
       }
       STATUS current
       DESCRIPTION
           "A notification to report the failure of a dynamic channel
            change request during the dynamic channel
            change process and is detected by the CMTS.

            This notification sends additional information about
            the event by including the following objects in its
            varbinding list.
            - docsDevEvLevel: the priority level associated with the
              event.
            - docsDevEvId: the unique identifier of the event that
              occurred.
            - docsDevEvText: a textual description of the event.
            - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
              with which this notification is associated.
            - ifPhysAddress: the MAC address of the CMTS
              (if there is a cable card/interface in the CMTS,
              then it is actually the MAC address of the cable
              interface that connected to the CM) cable interface
              connected to the CM.
            - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
              that the reporting CM is operating in.
            - docsIfDocsisBaseCapability: the highest
              version of the DOCSIS specification (1.0, 1.1, 2.0)
              that the device is capable of supporting.
            - docsIfCmtsCmStatusModulationType: the upstream
              modulation methodology used by the CM.
           "
       ::= { docsDevCmtsNotifs 10 }

   docsDevCmtsDCCRspFailNotif NOTIFICATION-TYPE
```

```
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            docsIfCmtsCmStatusMacAddress,
            ifPhysAddress,
            docsIfCmtsCmStatusDocsisRegMode,
            docsIfDocsisBaseCapability,
            docsIfCmtsCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
            "A notification to report the failure of a dynamic channel
             change response during the dynamic channel
             change process and is detected by the CMTS.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
               event.
             - docsDevEvId: the unique identifier of the event that
               occurred.
             - docsDevEvText: a textual description of the event.

             - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
               with which this notification is associated.
             - ifPhysAddress: the MAC address of the CMTS
               (if there is a cable card/interface in the CMTS,
               then it is actually the MAC address of the cable
               interface that connected to the CM) cable interface
               connected to the CM.
             - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
               that the reporting CM is operating in.
             - docsIfDocsisBaseCapability: the highest
               version of the DOCSIS specification (1.0, 1.1, 2.0)
               that the device is capable of supporting.
             - docsIfCmtsCmStatusModulationType: the upstream
               modulation methodology used by the CM.
            "
        ::= { docsDevCmtsNotifs 11 }

    docsDevCmtsDCCAckFailNotif NOTIFICATION-TYPE
        OBJECTS {
            docsDevEvLevel,
            docsDevEvId,
            docsDevEvText,
            docsIfCmtsCmStatusMacAddress,
```

```
            ifPhysAddress,
            docsIfCmtsCmStatusDocsisRegMode,
            docsIfDocsisBaseCapability,
            docsIfCmtsCmStatusModulationType
        }
        STATUS current
        DESCRIPTION
            "A notification to report the failure of a dynamic channel
             change acknowledgement during the dynamic channel
             change process and is detected by the CMTS.

             This notification sends additional information about
             the event by including the following objects in its
             varbinding list.
             - docsDevEvLevel: the priority level associated with the
               event.
             - docsDevEvId: the unique identifier of the event that
               occurred.
             - docsDevEvText: a textual description of the event.
             - docsIfCmtsCmStatusMacAddress: the MAC address of the CM
               with which this notification is associated.
             - ifPhysAddress: the MAC address of the CMTS
               (if there is a cable card/interface in the CMTS,
               then it is actually the MAC address of the cable
               interface that connected to the CM) cable interface
               connected to the CM.
             - docsIfCmtsCmStatusDocsisRegMode: the QOS level (1.0, 1.1)
               that the reporting CM is operating in.
             - docsIfDocsisBaseCapability: the highest
               version of the DOCSIS specification (1.0, 1.1, 2.0)
               that the device is capable of supporting.
             - docsIfCmtsCmStatusModulationType: the upstream
               modulation methodology used by the CM.
            "
        ::= { docsDevCmtsNotifs 12}

    --
    --Conformance definitions
    --

    docsDevNotifConformance OBJECT IDENTIFIER
       ::= { docsDevNotifMIB 4 }
    docsDevNotifGroups OBJECT IDENTIFIER
       ::= { docsDevNotifConformance 1 }
    docsDevNotifCompliances OBJECT IDENTIFIER
       ::= { docsDevNotifConformance 2 }
    docsDevCmNotifCompliance MODULE-COMPLIANCE
        STATUS current
```

```
        DESCRIPTION
        "The compliance statement for CM Notifications and Control."

        MODULE --docsDevNotif
          MANDATORY-GROUPS {
                    docsDevCmNotifControlGroup,
                    docsDevCmNotificationGroup
                }
        ::= { docsDevNotifCompliances 1 }

    docsDevCmNotifControlGroup OBJECT-GROUP
        OBJECTS {
            docsDevCmNotifControl
        }
        STATUS current
        DESCRIPTION
            "This group represents objects that allow control
             over CM Notifications."
        ::= { docsDevNotifGroups 1 }

    docsDevCmNotificationGroup NOTIFICATION-GROUP
        NOTIFICATIONS {
            docsDevCmInitTLVUnknownNotif,
            docsDevCmDynServReqFailNotif,
            docsDevCmDynServRspFailNotif,
            docsDevCmDynServAckFailNotif,
            docsDevCmBpiInitNotif,
            docsDevCmBPKMNotif,
            docsDevCmDynamicSANotif,
            docsDevCmDHCPFailNotif,
            docsDevCmSwUpgradeInitNotif,
            docsDevCmSwUpgradeFailNotif,
            docsDevCmSwUpgradeSuccessNotif,
            docsDevCmSwUpgradeCVCFailNotif,
            docsDevCmTODFailNotif,
            docsDevCmDCCReqFailNotif,
            docsDevCmDCCRspFailNotif,
            docsDevCmDCCAckFailNotif
        }
        STATUS current
        DESCRIPTION
            "A collection of CM notifications providing device status
       and control."
        ::= { docsDevNotifGroups 2 }

    docsDevCmtsNotifCompliance MODULE-COMPLIANCE
        STATUS current
        DESCRIPTION
```

```
            "The compliance statement for DOCSIS CMTS Notification
             and Control."
        MODULE --docsDevNotif
           MANDATORY-GROUPS {
              docsDevCmtsNotifControlGroup,
              docsDevCmtsNotificationGroup
           }
        ::= { docsDevNotifCompliances 2 }

    docsDevCmtsNotifControlGroup OBJECT-GROUP
        OBJECTS {
            docsDevCmtsNotifControl
        }
        STATUS current
        DESCRIPTION
            "This group represents objects that allow control
             over CMTS Notifications."
        ::= { docsDevNotifGroups 3 }

    docsDevCmtsNotificationGroup NOTIFICATION-GROUP
        NOTIFICATIONS {
            docsDevCmtsInitRegReqFailNotif,
            docsDevCmtsInitRegRspFailNotif,
            docsDevCmtsInitRegAckFailNotif ,
            docsDevCmtsDynServReqFailNotif,
            docsDevCmtsDynServRspFailNotif,
            docsDevCmtsDynServAckFailNotif,
            docsDevCmtsBpiInitNotif,
            docsDevCmtsBPKMNotif,
            docsDevCmtsDynamicSANotif,
            docsDevCmtsDCCReqFailNotif,
            docsDevCmtsDCCRspFailNotif,
            docsDevCmtsDCCAckFailNotif
        }
        STATUS current
        DESCRIPTION
            "A collection of CMTS notifications providing device
             status and control."
        ::= { docsDevNotifGroups 4 }

    END
```

5. Contributors

Thanks go to the following people, who have made significant contributions to this document: Junming Gao, Jean-Francois Mule, Dave Raftus, Pak Siripunkaw, and Rich Woundy.

6. Acknowledgements

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7. Security Considerations

There are two management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create (docsDevCmNotifControl and docsDevCmtsNotifControl). 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.

Setting docsDevCmNotifControl or docsDevCmtsNotifControl may cause flooding of notifications, which can disrupt network service. Besides causing "flooding", changing the objects can also mean that notifications will not be emitted when one intends that to happen.

This MIB defines a number of notification objects that send detailed information about the event that caused the generation of the notification. Information in the notification message includes: event priority, the event Id, the event message body, the CM DOCSIS capability, the CM DOCSIS QOS level, the CM DOCSIS upstream modulation type, the cable interface MAC address of the cable modem, and the cable card MAC address of the CMTS to which the modem is connected. The monitoring of these notification messages could be used to gather information about the state of the network and devices (CM and CMTS) attached to the network.

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 [16], 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.

8. 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
docsDevNotifMIB	{ mib-2 132 }

9. References

9.1. Normative References

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[14] CableLabs, "Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification CM-SP-RFIv1.1-C01-050907", September 2005, <http://www.cablemodem.com/specifications/>.

[15] CableLabs, "Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification CM-SP-RFIv2.0-I10-051209", December 2005, <http://www.cablemodem.com/specifications/>.

9.2. Informative References

[16] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.

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