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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

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it defines a basic set of managed objects for Simple Network Management Protocol (SNMP) based 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 (CMTSSs). 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

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ORGANIZATION "IETF IP over Cable Data Network
Working Group"

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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.

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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

```

```

        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

```

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,
        docsDevCmtsDCCRReqFailNotif,
        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

- [1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.
- [2] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [3] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
- [4] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.
- [5] 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.
- [6] Raftus, D. and E. Cardona, "Radio Frequency (RF) Interface Management Information Base for Data over Cable Service Interface Specifications (DOCSIS) 2.0 Compliant RF Interfaces", RFC 4546, June 2006.
- [7] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", RFC 2863, June 2000.
- [8] SCTE Data Standards Subcommittee, "Data-Over-Cable Service Interface Specifications: DOCSIS 1.0 Baseline Privacy Interface Specification SCTE 22-2", 2002, <<http://www.scte.org/standards/>>.

- [9] CableLabs, "Baseline Privacy Plus Interface Specification SP-BPI+040407", April 2004,
<<http://www.cablemodem.com/specifications/>>.
- [10] SCTE Data Standards Subcommittee, "Data-Over-Cable Service Interface Specifications: DOCSIS 1.0 Operations Support System Interface Specification Radio Frequency Interface SCTE 22-3", 2002, <<http://www.scte.org/standards/>>.
- [11] CableLabs, "Data-Over-Cable Service Interface Specifications: Operations Support System Interface Specification CM-SP-OSSIV1.1-C01-050907", September 2005,
<<http://www.cablemodem.com/specifications/>>.
- [12] CableLabs, "Data-Over-Cable Service Interface Specifications: Operations Support System Interface Specification CM-SP-OSSIV2.0-I09-050812", August 2005,
<<http://www.cablemodem.com/specifications/>>.
- [13] SCTE Data Standards Subcommittee, "Data-Over-Cable Service Interface Specifications: DOCSIS 1.0 Radio Frequency Interface Specification SCTE 22-1", 2002,
<<http://www.scte.org/standards/>>.
- [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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