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**Definitions of Managed Object Extensions
for Very High Speed Digital Subscriber Lines (VDSL) Using
Single Carrier Modulation (SCM) Line Coding.**

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Abstract

   This document defines a portion of the Management Information Base
   (MIB) module for use with network management protocols in the
   Internet community. In particular, it describes objects used for
   managing the Line Code Specific parameters of Very High Speed
   Digital Subscriber Line (VDSL) interfaces using Single Carrier
   Modulation (SCM) Line Coding. It is an optional extension to the
   VDSL-LINE CORE MIB RFC XXXX [RFCXXXX] which handles the line code
   independent objects.

Table of Contents

1. The Internet-Standard Management Framework

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

   Managed objects are accessed via a virtual information store, termed
   the Management Information Base or MIB. MIB objects are generally
   accessed through the Simple Network Management Protocol (SNMP).
   Objects in the MIB are defined using the mechanisms defined in the
   Structure of Management Information (SMI). This memo specifies a
   MIB module that is compliant to the SMIv2, which is described in STD
   58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC
   2580 [RFC2580].

2. Overview

   This document describes an SNMP MIB module for managing the line
   code dependent (Physical Medium Dependent) Layer of SCM VDSL Lines.
   These definitions are based upon the specifications for VDSL as
   defined in T1E1, ETSI, and ITU documentation [T1E1311, T1E1011,
   T1E1013, ETSI2701, ETSI2702, ITU9931, ITU9971]. Additionally the protocol-
   dependent (and line-code dependent) management framework for VDSL
   lines specified by DSLF has been taken into consideration [DSLFXXXXXX].

   The MIB module is located in the MIB tree under MIB 2 transmission,
   as discussed in the MIB-2 Integration (RFC 2863 [RFC2863]) section
   of this document.

2.1 Relationship of this MIB Module to other MIB Modules

The relationship of the VDSL Line MIB to other MIBS and in particular
to the IF-MIB, as presented in RFC 2863 [RFC2863], is discussed in the
VDSL-LINE CORE MIB RFC XXXX [RFCXXXX]. This section outlines the

   relationship of this VDSL Line Extension MIB to the VDSL-LINE CORE MIB
   RFC XXXX [RFCXXXX].

2.2 Conventions used in the MIB Module

2.2.1 Naming Conventions

   A. Vtuc -- (VTUC) transceiver at near (Central) end of line
   B. Vtur -- (VTUR) transceiver at Remote end of line
   C. Vtu -- One of either Vtuc or Vtur
   D. Curr -- Current
   E. Prev -- Previous
   F. Atn -- Attenuation
   G. ES   -- Errored Second
   H. SES -- Severely Errored Second
   I. UAS -- Unavailable Second
   J. LCS -- Line Code Specific
   K. Lof -- Loss of Frame
   L. Lol -- Loss of Link
   M. Los -- Loss of Signal
   N. Lpr -- Loss of Power
   O. xxxs -- Sum of Seconds in which xxx has occurs (e.g., xxx=Lof,
                  Los, Lpr, Lol)
   P. Max -- Maximum
   Q. Mgn -- Margin
   R. Min -- Minimum
   S. Psd -- Power Spectral Density
   T. Snr -- Signal to Noise Ratio
   U. Tx   -- Transmit
   V. Blks -- Blocks

2.3 Structure

   The SCM VDSL Line Extension MIB contains the following MIB group:

   o   vdslSCMGroup :

   This group supports MIB objects for defining configuration profiles
   and for montioring individual bands of Single Carrier Modulation (SCM)
   VDSL modems. It contains the following tables:

      - vdslLineSCMConfProfileTxBandTable
      - vdslSCMPhysBandTable

   Either none, one or both objects in this group MAY be implemented for
   SCM VDSL lines.

   Figure 1, below, displays the relationship of the tables in the

vdslSCMGroup to the vdslGroup and to the ifEntry:

```
    ifEntry(ifType=97)  ----> vdslLineTableEntry 1:(0..1)

     vdslLineTableEntry (vdslLineCoding=SCM)
               ----> vdslPhysTableEntry 1:(0..2)
               ----> vdslSCMPhysBandTable 1:(0..1)



     vdslLineConfProfileEntry(vdslLineConfProfileName)
               ----> vdslLineSCMConfProfileTxBandTable 1:(0..1)
```

                    Figure 1: Table Relationships

   When the vdslLineCoding is set to SCM, the vdslLineConfProfileName
   which is the index of the vdslLineConfProfileEntry is also used as
   the index to the vdslLineSCMConfProfileTxBandTable of the
   vdslSCMGroup. The existence of an entry in any of the tables of
   the vdslSCMGroup is optional. Either none, one or both of the
   vdslSCMGroup tables MAY be implemented for a particular VDSL line
   entity using SCM Line Coding.

2.4 Persistence

   All read-write and read-create objects defined in this MIB module
   SHOULD be stored persistently. Following is an exhaustive list of
   these persistent objects:

```
        vdslSCMConfProfileTxBandSide
        vdslSCMConfProfileTxBandNumber
        vdslSCMConfProfileTxBandCenterFrequency
        vdslSCMConfProfileTxBandSymbolRate
        vdslSCMConfProfileTxBandConstellationSize
        vdslSCMConfProfileTxBandTransmitPSDLevel
        vdslSCMConfProfileTxBandRowStatus
        vdslSCMPhysBandSide
        vdslSCMPhysBandNumber
        vdslSCMPhysBandCurrSnrMgn
        vdslSCMPhysBandCurrAtn
        vdslSCMPhysBandCurrPSDLevel
        vdslSCMPhysBandCurrSymbolRate
        vdslSCMPhysBandCurrConstellationSize
        vdslSCMPhysBandCurrCenterFrequency
```

   It SHOULD also be noted that interface indices in this MIB are
   maintained persistently. VACM data relating to these SHOULD be
   stored persistently as well [RFC2575].

3. Conformance and Compliance

For SCM VDSL lines, the following group is optional:
  - vdslSCMGroup

[4](#). **Definitions**

```
VDSL-LINE-EXT-SCM MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY,
OBJECT-TYPE,
Counter64,
Gauge32,
Integer32,
Unsigned32,
NOTIFICATION-TYPE,
transmission                 FROM SNMPv2-SMI
TEXTUAL-CONVENTION,
RowStatus,
TruthValue                   FROM SNMPv2-TC
HCPerfValidIntervals,
HCPerfInvalidIntervals,
HCPerfTimeElapsed,
HCPerfIntervalThreshold,
HCPerfCurrentCount,
HCPerfIntervalCount          FROM HC-PerfHist-TC-MIB
MODULE-COMPLIANCE,
OBJECT-GROUP,
NOTIFICATION-GROUP           FROM SNMPv2-CONF
ifIndex                      FROM IF-MIB
SnmpAdminString              FROM SNMP-FRAMEWORK-MIB;
vdslLineConfProfileName      FROM VDSL-LINE-MIB
vdslPhysSide                 FROM VDSL-LINE-MIB
vdslLineEntity               FROM VDSL-LINE-MIB

vdslExtSCMMIB MODULE-IDENTITY
   LAST-UPDATED "200307270000Z" -- July 21, 2003
   ORGANIZATION "ADSLMIB Working Group"
   CONTACT-INFO "WG-email:  adslmib@ietf.org
         Info:      https://www1.ietf.org/mailman/listinfo/adslmib

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          "
    DESCRIPTION
        "The VDSL Line core MIB found in RFC XXXX defines objects for
        the management of a pair of VDSL transceivers at each end of
        the VDSL line. The core MIB configures and monitors the line
        code independent parameters (TC layer) of the VDSL line.
        This MIB module is an optional extension of the core MIB and
        defines objects for configuration and monitoring of the line
        code specific (LCS) elements (PMD layer) for VDSL lines using
        SCM coding. The objects in this extension MIB MUST NOT be used
        for VDSL lines using MCM line coding.

        Naming Conventions:
            Vtuc -- (VTUC) transceiver at near (Central) end of line
            Vtur -- (VTUR) transceiver at Remote end of line
            Vtu -- One of either Vtuc or Vtur
            Curr -- Current
            Prev -- Previous
            Atn -- Attenuation
            ES   -- Errored Second.
            SES -- Severely Errored Second
            UAS -- Unavailable Second
            LCS -- Line Code Specific
            Lof -- Loss of Frame
            Lol -- Loss of Link
            Los -- Loss of Signal
            Lpr -- Loss of Power
            xxxs -- Interval of Seconds in which xxx occurs
                    (e.g., xxx=Lof, Los, Lpr)
            Max -- Maximum
            Mgn -- Margin
            Min -- Minimum
            Psd -- Power Spectral Density

```
            Snr  -- Signal to Noise Ratio
            Tx   -- Transmit
            Blks -- Blocks
     "
```

```
     vdslLineExtSCMMib    OBJECT IDENTIFIER ::= { vdslEXTSCMMIB 1 }
     vdslEXTSCMMibObjects OBJECT IDENTIFIER ::= { vdslLineExtSCMMib 1 }

     --
     -- Single carrier modulation (SCM) configuration profile tables
     --


     vdslLineSCMConfProfileTxBandTable OBJECT-TYPE
         SYNTAX       SEQUENCE OF VdslLineSCMConfProfileTxBandEntry
         MAX-ACCESS   not-accessible
         STATUS       current
         DESCRIPTION
            "This table contains transmit band descriptor configuration
             information for a VDSL line.  Each entry in this table
             reflects the configuration for one of possibly many bands
             or sub-bands of a single carrier modulation (SCM) VDSL line.
             These entries are defined by a manager and can be used to
             configure the VDSL line."
         ::= { vdslEXTSCMMibObjects 1 }

     vdslLineSCMConfProfileTxBandEntry OBJECT-TYPE
         SYNTAX       VdslLineSCMConfProfileTxBandEntry
         MAX-ACCESS   not-accessible
         STATUS       current
         DESCRIPTION
             "Each entry consists of a list of parameters that
             represents the configuration of a single carrier
             modulation VDSL modem transmit band.

             A default profile with an index of 'DEFVAL', will
             always exist and its parameters will be set to vendor
             specific values, unless otherwise specified in this
             document."

         INDEX { vdslLineConfProfileName,
                 vdslSCMConfProfileTxBandSide,
                 vdslSCMConfProfileTxBandNumber }
         ::= { vdslLineSCMConfProfileTxBandTable 1 }

     VdslLineSCMConfProfileTxBandEntry ::=
         SEQUENCE
             {
             vdslSCMConfProfileTxBandSide                VdslLineEntity,
             vdslSCMConfProfileTxBandNumber             INTEGER,
             vdslSCMConfProfileTxBandCenterFrequency  Unsigned32,
             vdslSCMConfProfileTxBandSymbolRate       Unsigned32,
             vdslSCMConfProfileTxBandConstellationSize Unsigned32,
             vdslSCMConfProfileTxBandTransmitPSDLevel  Unsigned32,
```

```
       vdslSCMConfProfileTxBandRowStatus          RowStatus
       }
```

```
    vdslSCMConfProfileTxBandSide OBJECT-TYPE
        SYNTAX      VdslLineEntity
        MAX-ACCESS  not-accessible
        STATUS  current
        DESCRIPTION
            "Identifies whether this band entry describes
            downstream or upstream transmission."
        ::= { vdslLineSCMConfProfileTxBandEntry 1 }

    vdslSCMConfProfileTxBandNumber OBJECT-TYPE
        SYNTAX      INTEGER
        MAX-ACCESS  not-accessible
        STATUS  current
        DESCRIPTION
            "The transmit band or sub-band number for this entry."
        ::= { vdslLineSCMConfProfileTxBandEntry 2 }

    vdslSCMConfProfileTxBandSymbolRate OBJECT-TYPE
        SYNTAX      Unsigned32
        UNITS       "kbaud"
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
            "The requested symbol rate in kbaud."
        REFERENCE   "T1E1.4/2000-011R3"    -- Part 2, SCM
        ::= { vdslLineSCMConfProfileTxBandEntry 3 }

    vdslSCMConfProfileTxBandConstellationSize OBJECT-TYPE
        SYNTAX      Unsigned32 (0..16)
        UNITS       "log2"
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
            "Specifies the constellation size."
        REFERENCE   "T1E1.4/2000-011R3"    -- Part 2, SCM
        ::= { vdslLineSCMConfProfileTxBandEntry 4 }

    vdslSCMConfProfileTxBandCenterFrequency OBJECT-TYPE
        SYNTAX      Unsigned32
        UNITS       "kHz"
        MAX-ACCESS  read-create
        STATUS      current
        DESCRIPTION
            "Specifies the center frequency in Khz"
        REFERENCE   "T1E1.4/2000-011R3"    -- Part 2, SCM
        ::= { vdslLineSCMConfProfileTxBandEntry 5 }
```

    vdslSCMConfProfileTxBandTransmitPSDLevel OBJECT-TYPE
        SYNTAX   INTEGER
        UNITS   "-dBm/Hz"
        MAX-ACCESS   read-create
        STATUS   current
        DESCRIPTION
        "The requested transmit power spectral density for the VDSL
         modem. The Actual value in dBm/Hz."
        REFERENCE   "T1E1.4/2000-011R3"   -- Part 2, SCM
        ::= { vdslLineSCMConfProfileTxBandEntry 6 }

    vdslSCMConfProfileTxBandRowStatus OBJECT-TYPE
        SYNTAX   RowStatus
        MAX-ACCESS   read-create
        STATUS   current
        DESCRIPTION
            "This object is used to create a new row or modify or
            delete an existing row in this table.

            A profile activated by setting this object to `active'.
            When `active' is set, the system will validate the profile.

            Before a profile can be deleted or taken out of
            service, (by setting this object to `destroy' or
            `outOfService') it must be first unreferenced
            from all associated lines."
        ::= { vdslLineSCMConfProfileTxBandEntry 7 }

    --
    -- SCM physical band status
    --

    vdslSCMPhysBandTable OBJECT-TYPE
        SYNTAX   SEQUENCE OF VdslSCMPhysBandEntry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
            "This table provides one row for each SCM Vtu band."
        ::= { vdslEXTSCMMibObjects 2 }

    vdslSCMPhysBandEntry OBJECT-TYPE
        SYNTAX   VdslSCMPhysBandEntry
        MAX-ACCESS   not-accessible
        STATUS   current
        DESCRIPTION
            "An entry in the vdslSCMPhysBandTable."

        INDEX { ifIndex,

```
            vdslPhysSide,
            vdslSCMPhysBandNumber  }
    ::= { vdslSCMPhysBandTable 1 }
```

```
    VdslSCMPhysBandEntry ::=
        SEQUENCE
            {
            vdslSCMPhysBandNumber                 INTEGER,
            vdslSCMPhysBandCurrSnrMgn             Integer32,
            vdslSCMPhysBandCurrAtn                Unsigned32,
            vdslSCMPhysBandCurrPSDLevel           Unsigned32,
            vdslSCMPhysBandCurrSymbolRate         Unsigned32,
            vdslSCMPhysBandCurrConstellationSize  Unsigned32,
            vdslSCMPhysBandCurrCenterFrequency    Unsigned32,

            }

    vdslSCMPhysBandNumber OBJECT-TYPE
        SYNTAX        INTEGER
        MAX-ACCESS    not-accessible
        STATUS        current
        DESCRIPTION
            "The SCM transmit band number for this entry."
        ::= { vdslSCMPhysBandEntry 1 }

    vdslSCMPhysBandCurrSnrMgn OBJECT-TYPE
        SYNTAX        Integer32
        UNITS         "0.25 dBm"
        MAX-ACCESS    read-only
        STATUS        current
        DESCRIPTION
            "Noise margin as seen by this Vtu and band with respect
            to its received signal in 0.25 dB."
        ::= { vdslSCMPhysBandEntry 2 }

    vdslSCMPhysBandCurrAtn OBJECT-TYPE
        SYNTAX        Unsigned32 (0..255)
        UNITS         "0.25 dBm"
        MAX-ACCESS    read-only
        STATUS        current
        DESCRIPTION
            "Measured difference in the total power transmitted by
            the peer Vtu on this band and the total power received
            by this Vtu on this band in 0.25 dB."
        ::= { vdslSCMPhysBandEntry 3 }

    vdslSCMPhysBandCurrSymbolRate    OBJECT-TYPE
        SYNTAX        Unsigned32
        UNITS         "kbaud"
        MAX-ACCESS    read-create
        STATUS        current
        DESCRIPTION
```

```
              "The current value of the symbol rate in kbaud for this
               band."
          REFERENCE    "T1E1.4/2000-011R3"    -- Part 2, SCM
          ::= { vdslSCMPhysBandEntry 4 }
```

```
    vdslSCMPhysBandCurrConstellationSize OBJECT-TYPE
        SYNTAX       Unsigned32 (0..16)
        UNITS        "log2"
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "The current constellation size on this band."
        REFERENCE    "T1E1.4/2000-011R3"    -- Part 2, SCM
        ::= { vdslSCMPhysBandEntry 5 }

    vdslSCMPhysBandCurrCenterFrequency OBJECT-TYPE
        SYNTAX       Unsigned32
        UNITS        "kHz"
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "The current center frequency in kHz for this band."
        REFERENCE    "T1E1.4/2000-011R3"    -- Part 2, SCM
        ::= { vdslSCMPhysBandEntry 6 }

     -- conformance information

    vdslExtSCMConformance OBJECT IDENTIFIER ::= { vdslLineExtSCMMib 2 }
    vdslExtSCMGroups OBJECT IDENTIFIER ::= { vdslExtSCMConformance 1 }
    vdslExtSCMCompliances OBJECT IDENTIFIER ::=
                                  { vdslExtSCMConformance 2 }

    vdslLineExtSCMMibCompliance MODULE-COMPLIANCE
        STATUS  current
        DESCRIPTION
            "The compliance statement for SNMP entities which
            manage VDSL interfaces."

        MODULE  -- this module

        GROUP        vdslSCMGroup
        DESCRIPTION
            "This group is an optional extension for VDSL lines which
            utilize single carrier modulation (SCM)."

        ::= { vdslCompliances 1 }

    -- units of conformance

        vdslSCMGroup    OBJECT-GROUP
            OBJECTS
                {
                vdslSCMPhysBandCurrSnrMgn,
                vdslSCMPhysBandCurrAtn,
                vdslSCMPhysBandCurrPSDLevel,
```

```
                    vdslSCMPhysBandCurrSymbolRate,
                    vdslSCMPhysBandCurrConstellationSize,
                    vdslSCMPhysBandCurrCenterFrequency,
```

```
              vdslSCMConfProfileTxBandTransmitPSDLevel,
              vdslSCMConfProfileTxBandSymbolRate,
              vdslSCMConfProfileTxBandConstellationSize,
              vdslSCMConfProfileTxBandCenterFrequency,
              vdslSCMConfProfileTxBandRowStatus
              }
          STATUS     current
          DESCRIPTION
              "A collection of objects providing configuration
              information for a VDSL line based upon single carrier
              modulation modem."
      ::= { vdslGroups 1 }

 END
```

5. Intellectual Property Notice

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Director.

6. Normative References

[ETSI2701] ETSI TS 101 270-1 V1.2.1 "Transmission and Multiplexing
           (TM); Access transmission systems on metallic access
           cables; Very high speed Digital Subscriber Line (VDSL);
           Part 1: Functional requirements", October 1999.

[ETSI2702] ETSI TS 101 270-2 V1.1.1 "Transmission and Multiplexing
           (TM); Access transmission systems on metallic access
           cables; Very high speed Digital Subscriber Line (VDSL);
           Part 1: Transceiver specification", February 2001.

    [ITU9931] ITU-T G.993.1 "Very-high-speed digital subscriber line
               foundation", November 2001.

   [ITU9971]   ITU-T G.997.1 "Physical layer management for Digital
               Subscriber Line (DSL) Transceivers", July 1999.

   [RFC2493]   Tesink, K., "Textual Conventions for MIB Modules Using
               Performance History Based on 15 Minute Intervals", RFC
               2493, January 1999.

   [RFC2578]   McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J.,
               Rose, M. and S. Waldbusser, "Structure of Management
               Information Version 2 (SMIv2)", STD 58, RFC 2578, April
               1999.

   [RFC2579]   McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J.,
               Rose, M. and S. Waldbusser, "Textual Conventions for
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   [RFC2580]   McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J.,
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               Simple Network Management Protocol (SNMP)", STD 62, RFC
               3418, December 2002.

   [RFCXXXX] Ray, B. and R. Abbi, "Definitions of Managed Objects for
               Very High Speed Digital Subscriber Lines (VDSL)", RFC XXXX,
               YYYY 2003.

   [RFCXXXX] Ray, B. and R. Abbi, "High Capacity Textual Conventions
               for MIB Modules Using Performance History Based on
               15 Minute Intervals", RFC XXXX, YYYY 2003.

   [T1E1311]   ANSI T1E1.4/2001-311, "Very-high-bit-rate Digital
               Subscriber Line (VDSL) Metallic Interface, Part 1:
               Functional Requirements and Common Specification",
               February 2001.

   [T1E1011]   ANSI T1E1.4/2001-011R3, "VDSL Metallic Interface, Part 2:
               Technical Specification for a Single-Carrier Modulation
               (SCM) Transceiver", November 2001.

   [T1E1013]   ANSI T1E1.4/2001-013R4, "VDSL Metallic Interface, Part 3:
               Technical Specification for a Multi-Carrier Modulation
               (MCM) Transceiver", November 2000.

7. Informative References

   [RFC2575] Wijnen, B., Presuhn, R. and K. McCloghrie, "View-based
              Access Control Model (VACM) for the Simple Network
              Management Protocol (SNMP)", RFC 2575, April 1999.

   [RFC3410] Case, J., Mundy, R., Partain, D. and B. Stewart,
             "Introduction and Applicability Statements for Internet-
             Standard Management Framework", RFC 3410, December 2002.

8. Security Considerations

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

   VDSL layer connectivity from the Vtur will permit the subscriber
   to manipulate both the VDSL link directly and the VDSL embedded
   operations channel (EOC) for their own loop. For example, unchecked
   or unfiltered fluctuations initiated by the subscriber could
   generate sufficient notifications to potentially overwhelm either
   the management interface to the network or the element manager.

   For this reason, there are a number of managed objects in this MIB
   that may contain sensitive information.

   It is thus important to control even GET access to these objects and
   possibly to even encrypt the values of these objects when sending
   them over the network via SNMP. Not all versions of SNMP provide
   features for such a secure environment.

   Further, notifications generated by agents implementing this MIB
   will contain the above threshold information.

   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) objects
   which utilize the textual conventions defined in this MIB module.

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

   Further, deployment of SNMP versions prior to SNMPv3 is NOT
   RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to
   enable cryptographic security. It is then a customer/operator
   responsibility to ensure that the SNMP entity giving access to an
   instance of a MIB module which utilizes the textual conventions
   defined in 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.

9. Acknowledgments

   This document contains many definitions taken from
   draft-ietf-adslmib-vdsl-07.txt. As such any credit for the text
   found within should be full attributed to the authors of that
   document.

10. Authors' Addresses

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