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Definitions of Managed Object Extensions for Very High Speed Digital Subscriber Lines (VDSL) Using Multiple Carrier Modulation (MCM) Line Coding

Status of This Memo

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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 Multiple Carrier Modulation (MCM) Line Coding. It is an optional extension to the VDSL-LINE-MIB, RFC 3728, which handles line code independent objects.

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1. The Internet-Standard Management Framework

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

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

2. Overview

This document describes an SNMP MIB module for managing the Line Code Dependent, Physical Medium Dependent (PMD), Layer of MCM VDSL Lines. These definitions are based upon the specifications for VDSL as defined in T1E1, European Telecommunications Standards Institute (ETSI), and International Telecommunication Union (ITU) documentation [T1E1311, T1E1011, T1E1013, ETSI2701, ETSI2702, ITU9931, ITU9971]. Additionally the protocol-dependent (and line-code dependent) management framework for VDSL lines specified by the Digital Subscriber Line Forum (DSLF) has been taken into consideration [DSLFTR57].

The MIB module is located in the MIB tree under MIB-2 transmission.

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

2.1. Relationship of this MIB Module to other MIB Modules

The relationship of the VDSL Line MIB module to other MIB modules and in particular to the IF-MIB, as presented in RFC 2863 [RFC2863], is discussed in the VDSL-LINE-MIB, RFC 3728 [RFC3728]. This section outlines the relationship of this VDSL Line Extension MIB to the VDSL-LINE-MIB, RFC 3728 [RFC3728].

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. LCS -- Line Code Specific
F. Max -- Maximum
G. PSD -- Power Spectral Density
H. Rx -- Receive
I. Tx -- Transmit

2.3. Structure

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

o vdslMCMGroup :

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

- vdslLineMCMConfProfileTable
- vdslLineMCMConfProfileTxBandTable
- vdslLineMCMConfProfileRxBandTable
- vdslLineMCMConfProfileTxPSDTable
- vdslLineMCMConfProfileMaxTxPSDTable
- vdslLineMCMConfProfileMaxRxPSDTable

If the MCM VDSL Line Extension MIB is implemented then all of the objects in this group MUST be implemented.

Figure 1, below, displays the relationship of the tables in the vdslMCMGroup to the vdslGroup and to the ifEntry:

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

vdslLineTableEntry (vdslLineCoding=MCM)

vdslLineConfProfileEntry(vdslLineConfProfileName)
           ----> vdslLineMCMConfProfileTable 1:(0..1)
           ----> vdslLineMCMConfProfileTxBandTable 1:(0..n)
           ----> vdslLineMCMConfProfileRxBandTable 1:(0..n)
           ----> vdslLineMCMConfProfileTxPSDTable 1:(0..n)
           ----> vdslLineMCMConfProfileMaxTxPSDTable 1:(0..n)
           ----> vdslLineMCMConfProfileMaxRxPSDTable 1:(0..n)
```

Figure 1: Table Relationships

When the object vdslLineCoding is set to MCM, vdslLineConfProfileName is used as the index to each of the six vdslLineMCMConfProfile Tables. The existence of an entry in any of the tables of the vdslMCMGroup is optional.

2.4. Persistence

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

- vdslMCMConfProfileTxWindowLength
- vdslMCMConfProfileRowStatus
- vdslMCMConfProfileTxBandNumber
- vdslMCMConfProfileTxBandStart
- vdslMCMConfProfileTxBandStop
- vdslMCMConfProfileTxBandRowStatus
- vdslMCMConfProfileRxBandStart
- vdslMCMConfProfileRxBandStop
- vdslMCMConfProfileRxBandRowStatus
- vdslMCMConfProfileTxPSDTone
- vdslMCMConfProfileTxPSDPSD
- vdslMCMConfProfileTxPSDRowStatus
- vdslMCMConfProfileMaxTxPSDTone
- vdslMCMConfProfileMaxTxPSDPSD
- vdslMCMConfProfileMaxTxPSDRowStatus
- vdslMCMConfProfileMaxRxPSDTone
- vdslMCMConfProfileMaxRxPSDPSD
- vdslMCMConfProfileMaxRxPSDRowStatus

Note also that the interface indices in this MIB are maintained persistently. View-based Access Control Model (VACM) data relating to these SHOULD be stored persistently as well [RFC3415].

3. Conformance and Compliance

An MCM based VDSL agent does not have to implement this MIB to be compliant with RFC 3728 [RFC3728]. If the MCM VDSL Line Extension MIB is implemented then the following group is mandatory:

- vdslMCMGroup

4. Definitions

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

IMPORTS
MODULE-IDENTITY,
OBJECT-TYPE,
transmission,
Unsigned32                      FROM SNMPv2-SMI         -- [RFC2578]
RowStatus                       FROM SNMPv2-TC          -- [RFC2579]
MODULE-COMPLIANCE,
OBJECT-GROUP                    FROM SNMPv2-CONF        -- [RFC2580]
vdslLineConfProfileName         FROM VDSL-LINE-MIB;     -- [RFC3728]

vdslExtMCMMIB MODULE-IDENTITY
   LAST-UPDATED "200504280000Z" --    April 28, 2005
   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-MIB found in RFC 3728 defines objects for
       the management of a pair of VDSL transceivers at each end of
       the VDSL line.  The VDSL-LINE-MIB configures and monitors the
       line code independent parameters (TC layer) of the VDSL line.
       This MIB module is an optional extension of the VDSL-LINE-MIB
       and defines objects for configuration and monitoring of the
       line code specific (LCS) elements (PMD layer) for VDSL lines
       using MCM coding.  The objects in this extension MIB MUST NOT
       be used for VDSL lines using Single Carrier Modulation (SCM)
       line coding.  If an object in this extension MIB is referenced
       by a line which does not use MCM, it has no effect on the
       operation of that line.

       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
           LCS  -- Line Code Specific
           Max  -- Maximum
           PSD  -- Power Spectral Density
           Rx   -- Receive
           Tx   -- Transmit

       Copyright (C) The Internet Society (2005).  This version
       of this MIB module is part of RFC 4070: see the RFC
       itself for full legal notices."
           REVISION "200504280000Z" --    April 28, 2005
           DESCRIPTION "Initial version, published as RFC 4070."
       ::= { transmission 229 }

   vdslLineExtMCMMib OBJECT IDENTIFIER ::= { vdslExtMCMMIB 1 }
   vdslLineExtMCMMibObjects OBJECT IDENTIFIER ::= {vdslLineExtMCMMib 1}

   --
   -- Multiple carrier modulation (MCM) configuration profile tables
   --
```

```
   vdslLineMCMConfProfileTable OBJECT-TYPE
       SYNTAX       SEQUENCE OF VdslLineMCMConfProfileEntry
       MAX-ACCESS   not-accessible
       STATUS       current
       DESCRIPTION
           "This table contains additional information on multiple
           carrier VDSL lines.  One entry in this table reflects a
           profile defined by a manager which can be used to
           configure the VDSL line.

           If an entry in this table is referenced by a line which
           does not use MCM, it has no effect on the operation of that
           line.

           All read-create-objects defined in this table SHOULD be
           stored persistently."

       ::= { vdslLineExtMCMMibObjects  1 }

   vdslLineMCMConfProfileEntry OBJECT-TYPE
       SYNTAX       VdslLineMCMConfProfileEntry
       MAX-ACCESS   not-accessible
       STATUS       current
       DESCRIPTION
           "Each entry consists of a list of parameters that
           represents the configuration of a multiple carrier
           modulation VDSL modem."
       INDEX { vdslLineConfProfileName }
       ::= { vdslLineMCMConfProfileTable 1 }

   VdslLineMCMConfProfileEntry ::=
       SEQUENCE
           {
           vdslLineMCMConfProfileTxWindowLength       Unsigned32,
           vdslLineMCMConfProfileRowStatus            RowStatus
           }

   vdslLineMCMConfProfileTxWindowLength OBJECT-TYPE
       SYNTAX       Unsigned32 (1..255)
       UNITS        "samples"
       MAX-ACCESS   read-create
       STATUS       current
       DESCRIPTION
           "Specifies the length of the transmit window, counted
           in samples at the sampling rate corresponding to the
           negotiated value of N."
       REFERENCE    "T1E1.4/2000-013R4"    -- Part 3, MCM
       ::= { vdslLineMCMConfProfileEntry 1 }
```

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

           None of the columns in this row may be modified while the
           row is in the 'active' state.

           Before a profile can be deleted or taken out of
           service, (by setting this object to 'destroy' or
           'notInService') it must first be unreferenced
           from all associated lines."
       ::= { vdslLineMCMConfProfileEntry 2 }

   vdslLineMCMConfProfileTxBandTable OBJECT-TYPE
       SYNTAX       SEQUENCE OF VdslLineMCMConfProfileTxBandEntry
       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
           with a multiple carrier modulation (MCM) VDSL line.
           These entries are defined by a manager and can be used to
           configure the VDSL line.

           If an entry in this table is referenced by a line which
           does not use MCM, it has no effect on the operation of that
           line.

           All read-create-objects defined in this table SHOULD be
           stored persistently."
       ::= { vdslLineExtMCMMibObjects  2 }

   vdslLineMCMConfProfileTxBandEntry OBJECT-TYPE
       SYNTAX       VdslLineMCMConfProfileTxBandEntry
       MAX-ACCESS   not-accessible
       STATUS       current
       DESCRIPTION
           "Each entry consists of a transmit band descriptor, which
           is defined by a start and a stop tone index."
       INDEX { vdslLineConfProfileName,
```

```
                vdslLineMCMConfProfileTxBandNumber }
        ::= { vdslLineMCMConfProfileTxBandTable 1 }

    VdslLineMCMConfProfileTxBandEntry ::=
        SEQUENCE
            {
            vdslLineMCMConfProfileTxBandNumber          Unsigned32,
            vdslLineMCMConfProfileTxBandStart           Unsigned32,
            vdslLineMCMConfProfileTxBandStop            Unsigned32,
            vdslLineMCMConfProfileTxBandRowStatus       RowStatus
            }

    vdslLineMCMConfProfileTxBandNumber OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "The index for this band descriptor entry."
        ::= { vdslLineMCMConfProfileTxBandEntry 1 }

    vdslLineMCMConfProfileTxBandStart OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "Start tone index for this band."
        REFERENCE    "T1E1.4/2000-013R4"    -- Part 3, MCM
        ::= { vdslLineMCMConfProfileTxBandEntry 2 }

    vdslLineMCMConfProfileTxBandStop OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "Stop tone index for this band."
        REFERENCE    "T1E1.4/2000-013R4"    -- Part 3, MCM
        ::= { vdslLineMCMConfProfileTxBandEntry 3 }

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

```
            Each entry must be internally consistent, the Stop Tone must
            be greater than the Start Tone.  Each entry must also be
            externally consistent, all entries indexed by a specific
            profile must not overlap.  Validation of the profile will
            check both internal and external consistency.

            None of the columns in this row may be modified while the
            row is in the 'active' state.

            Before a profile can be deleted or taken out of
            service, (by setting this object to 'destroy' or
            'notInService') it must be first unreferenced
            from all associated lines."
        ::= { vdslLineMCMConfProfileTxBandEntry 4 }

    vdslLineMCMConfProfileRxBandTable OBJECT-TYPE
        SYNTAX       SEQUENCE OF VdslLineMCMConfProfileRxBandEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "This table contains receive band descriptor configuration
            information for a VDSL line.  Each entry in this table
            reflects the configuration for one of possibly many bands
            with a multiple carrier modulation (MCM) VDSL line.
            These entries are defined by a manager and can be used to
            configure the VDSL line.

            If an entry in this table is referenced by a line which
            does not use MCM, it has no effect on the operation of that
            line.

            All read-create-objects defined in this table SHOULD be
            stored persistently."
        ::= { vdslLineExtMCMMibObjects 3 }

    vdslLineMCMConfProfileRxBandEntry OBJECT-TYPE
        SYNTAX       VdslLineMCMConfProfileRxBandEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "Each entry consists of a transmit band descriptor, which
            is defined by a start and a stop tone index."

        INDEX { vdslLineConfProfileName,
                vdslLineMCMConfProfileRxBandNumber }
        ::= { vdslLineMCMConfProfileRxBandTable 1 }

    VdslLineMCMConfProfileRxBandEntry ::=
```

```
        SEQUENCE
            {
            vdslLineMCMConfProfileRxBandNumber          Unsigned32,
            vdslLineMCMConfProfileRxBandStart           Unsigned32,
            vdslLineMCMConfProfileRxBandStop            Unsigned32,
            vdslLineMCMConfProfileRxBandRowStatus       RowStatus
            }

    vdslLineMCMConfProfileRxBandNumber OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "The index for this band descriptor entry."
        ::= { vdslLineMCMConfProfileRxBandEntry 1 }

    vdslLineMCMConfProfileRxBandStart OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "Start tone index for this band."
        REFERENCE    "T1E1.4/2000-013R4"    -- Part 3, MCM
        ::= { vdslLineMCMConfProfileRxBandEntry 2 }


    vdslLineMCMConfProfileRxBandStop OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "Stop tone index for this band."
        REFERENCE    "T1E1.4/2000-013R4"    -- Part 3, MCM
        ::= { vdslLineMCMConfProfileRxBandEntry 3 }

    vdslLineMCMConfProfileRxBandRowStatus 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 is activated by setting this object to 'active'.
            When 'active' is set, the system will validate the profile.
            Each entry must be internally consistent, the Stop Tone must
            be greater than the Start Tone.  Each entry must also be
            externally consistent, all entries indexed by a specific
```

```
            profile must not overlap.  Validation of the profile will
            check both internal and external consistency.

            None of the columns in this row may be modified while the
            row is in the 'active' state.

            Before a profile can be deleted or taken out of
            service, (by setting this object to 'destroy' or
            'notInService') it must be first unreferenced
            from all associated lines."
        ::= { vdslLineMCMConfProfileRxBandEntry 4 }

    vdslLineMCMConfProfileTxPSDTable OBJECT-TYPE
        SYNTAX       SEQUENCE OF VdslLineMCMConfProfileTxPSDEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "This table contains transmit PSD mask descriptor
            configuration information for a VDSL line.  Each entry in
            this table reflects the configuration for one tone within
            a multiple carrier modulation (MCM) VDSL line.  These
            entries are defined by a manager and can be used to
            configure the VDSL line.

            If an entry in this table is referenced by a line which
            does not use MCM, it has no effect on the operation of that
            line.

            All read-create-objects defined in this table SHOULD be
            stored persistently."
        ::= { vdslLineExtMCMMibObjects 4 }

    vdslLineMCMConfProfileTxPSDEntry OBJECT-TYPE
        SYNTAX       VdslLineMCMConfProfileTxPSDEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "Each entry consists of a transmit PSD mask descriptor,
            which defines the power spectral density (PSD) for a tone."

        INDEX { vdslLineConfProfileName,
                vdslLineMCMConfProfileTxPSDNumber }
        ::= { vdslLineMCMConfProfileTxPSDTable 1 }

    VdslLineMCMConfProfileTxPSDEntry ::=
        SEQUENCE
            {
            vdslLineMCMConfProfileTxPSDNumber            Unsigned32,
```

```
            vdslLineMCMConfProfileTxPSDTone             Unsigned32,
            vdslLineMCMConfProfileTxPSDPSD              Unsigned32,
            vdslLineMCMConfProfileTxPSDRowStatus        RowStatus
            }

    vdslLineMCMConfProfileTxPSDNumber OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "The index for this mask descriptor entry."
        ::= { vdslLineMCMConfProfileTxPSDEntry 1 }

    vdslLineMCMConfProfileTxPSDTone OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "The tone index for which the PSD is being specified."
        REFERENCE    "T1E1.4/2000-013R4"    -- Part 3, MCM
        ::= { vdslLineMCMConfProfileTxPSDEntry 2 }

    vdslLineMCMConfProfileTxPSDPSD OBJECT-TYPE
        SYNTAX       Unsigned32
        UNITS        "0.5dBm/Hz"
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "Power Spectral Density level in steps of 0.5dBm/Hz with
            an offset of -140dBm/Hz."
        REFERENCE    "T1E1.4/2000-013R4"    -- Part 3, MCM
        ::= { vdslLineMCMConfProfileTxPSDEntry 3 }

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

            None of the columns in this row may be modified while the
            row is in the 'active' state.

            Before a profile can be deleted or taken out of
```

```
            service, (by setting this object to 'destroy' or
            'notInService') it must be first unreferenced
            from all associated lines."
        ::= { vdslLineMCMConfProfileTxPSDEntry 4 }

    vdslLineMCMConfProfileMaxTxPSDTable OBJECT-TYPE
        SYNTAX       SEQUENCE OF VdslLineMCMConfProfileMaxTxPSDEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "This table contains transmit maximum PSD mask descriptor
            configuration information for a VDSL line.  Each entry in
            this table reflects the configuration for one tone within
            a multiple carrier modulation (MCM) VDSL modem.  These
            entries are defined by a manager and can be used to
            configure the VDSL line.

            If an entry in this table is referenced by a line which
            does not use MCM, it has no effect on the operation of that
            line.

            All read-create-objects defined in this table SHOULD be
            stored persistently."
        ::= { vdslLineExtMCMMibObjects 5 }

    vdslLineMCMConfProfileMaxTxPSDEntry OBJECT-TYPE
        SYNTAX       VdslLineMCMConfProfileMaxTxPSDEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "Each entry consists of a transmit PSD mask descriptor,
            which defines the maximum power spectral density (PSD)
            for a tone."
        INDEX { vdslLineConfProfileName,
                vdslLineMCMConfProfileMaxTxPSDNumber }
        ::= { vdslLineMCMConfProfileMaxTxPSDTable 1 }

    VdslLineMCMConfProfileMaxTxPSDEntry ::=
        SEQUENCE
            {
            vdslLineMCMConfProfileMaxTxPSDNumber            Unsigned32,
            vdslLineMCMConfProfileMaxTxPSDTone              Unsigned32,
            vdslLineMCMConfProfileMaxTxPSDPSD               Unsigned32,
            vdslLineMCMConfProfileMaxTxPSDRowStatus         RowStatus
            }

    vdslLineMCMConfProfileMaxTxPSDNumber OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
```

```
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "The index for this band descriptor entry."
        ::= { vdslLineMCMConfProfileMaxTxPSDEntry 1 }

    vdslLineMCMConfProfileMaxTxPSDTone OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "The tone index for which the PSD is being specified.
             There must not be multiple rows defined, for a particular
             profile, with the same value for this field."
        REFERENCE    "T1E1.4/2000-013R4"    -- Part 3, MCM
        ::= { vdslLineMCMConfProfileMaxTxPSDEntry 2 }

    vdslLineMCMConfProfileMaxTxPSDPSD OBJECT-TYPE
        SYNTAX       Unsigned32
        UNITS        "0.5dBm/Hz"
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "Power Spectral Density level in steps of 0.5dBm/Hz with
            an offset of -140dBm/Hz."
        REFERENCE    "T1E1.4/2000-013R4"    -- Part 3, MCM
        ::= { vdslLineMCMConfProfileMaxTxPSDEntry 3 }

    vdslLineMCMConfProfileMaxTxPSDRowStatus 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 is activated by setting this object to 'active'.
            When 'active' is set, the system will validate the profile.
            There must be only one entry in this table for each tone
            associated with a specific profile.  This will be checked
            during the validation process.

            None of the columns in this row may be modified while the
            row is in the 'active' state.

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

```
        ::= { vdslLineMCMConfProfileMaxTxPSDEntry 4 }

    vdslLineMCMConfProfileMaxRxPSDTable OBJECT-TYPE
        SYNTAX       SEQUENCE OF VdslLineMCMConfProfileMaxRxPSDEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "This table contains maximum receive PSD mask descriptor
            configuration information for a VDSL line.  Each entry in
            this table reflects the configuration for one tone within
            a multiple carrier modulation (MCM) VDSL modem.  These
            entries are defined by a manager and can be used to
            configure the VDSL line.

            If an entry in this table is referenced by a line which
            does not use MCM, it has no effect on the operation of that
            line.

            All read-create-objects defined in this table SHOULD be
            stored persistently."
        ::= { vdslLineExtMCMMibObjects 6 }

    vdslLineMCMConfProfileMaxRxPSDEntry OBJECT-TYPE
        SYNTAX       VdslLineMCMConfProfileMaxRxPSDEntry
        MAX-ACCESS   not-accessible
        STATUS       current
        DESCRIPTION
            "Each entry consists of a transmit PSD mask descriptor,
            which defines the power spectral density (PSD) for a
            tone."

        INDEX { vdslLineConfProfileName,
                vdslLineMCMConfProfileMaxRxPSDNumber }
        ::= { vdslLineMCMConfProfileMaxRxPSDTable 1 }

    VdslLineMCMConfProfileMaxRxPSDEntry ::=
        SEQUENCE
            {
            vdslLineMCMConfProfileMaxRxPSDNumber           Unsigned32,
            vdslLineMCMConfProfileMaxRxPSDTone             Unsigned32,
            vdslLineMCMConfProfileMaxRxPSDPSD              Unsigned32,
            vdslLineMCMConfProfileMaxRxPSDRowStatus        RowStatus
            }

    vdslLineMCMConfProfileMaxRxPSDNumber OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
        MAX-ACCESS   not-accessible
        STATUS       current
```

```
        DESCRIPTION
            "The index for this band descriptor entry."
        ::= { vdslLineMCMConfProfileMaxRxPSDEntry 1 }

    vdslLineMCMConfProfileMaxRxPSDTone OBJECT-TYPE
        SYNTAX       Unsigned32 (1..4096)
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "The tone index for which the PSD is being specified.
             There must not be multiple rows defined, for a particular
             profile, with the same value for this field."
        REFERENCE    "T1E1.4/2000-013R4"    -- Part 3, MCM
        ::= { vdslLineMCMConfProfileMaxRxPSDEntry 2 }

    vdslLineMCMConfProfileMaxRxPSDPSD OBJECT-TYPE
        SYNTAX       Unsigned32
        UNITS        "0.5dBm/Hz"
        MAX-ACCESS   read-create
        STATUS       current
        DESCRIPTION
            "Power Spectral Density level in steps of 0.5dBm/Hz with
            an offset of -140dBm/Hz."
        REFERENCE    "T1E1.4/2000-013R4"    -- Part 3, MCM
        ::= { vdslLineMCMConfProfileMaxRxPSDEntry 3 }

    vdslLineMCMConfProfileMaxRxPSDRowStatus 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 is activated by setting this object to 'active'.
            When 'active' is set, the system will validate the profile.
            There must be only one entry in this table for each tone
            associated with a specific profile.  This will be checked
            during the validation process.

            None of the columns in this row may be modified while the
            row is in the 'active' state.

            Before a profile can be deleted or taken out of
            service, (by setting this object to 'destroy' or
            'notInService') it must be first unreferenced
            from all associated lines."
        ::= { vdslLineMCMConfProfileMaxRxPSDEntry 4 }
```

```
   -- conformance information

   vdslLineExtMCMConformance OBJECT IDENTIFIER ::=
                    { vdslLineExtMCMMib 2 }
   vdslLineExtMCMGroups OBJECT IDENTIFIER ::=
                    { vdslLineExtMCMConformance 1 }
   vdslLineExtMCMCompliances OBJECT IDENTIFIER ::=
                    { vdslLineExtMCMConformance 2 }

   vdslLineExtMCMMibCompliance MODULE-COMPLIANCE
       STATUS  current
       DESCRIPTION
           "The compliance statement for SNMP entities which
           manage VDSL interfaces."
       MODULE  -- this module
       MANDATORY-GROUPS
       {
           vdslLineExtMCMGroup
       }

       ::= { vdslLineExtMCMCompliances 1 }

   -- units of conformance

       vdslLineExtMCMGroup OBJECT-GROUP
           OBJECTS
               {
               vdslLineMCMConfProfileTxWindowLength,
               vdslLineMCMConfProfileRowStatus,
               vdslLineMCMConfProfileTxBandStart,
               vdslLineMCMConfProfileTxBandStop,
               vdslLineMCMConfProfileTxBandRowStatus,
               vdslLineMCMConfProfileRxBandStart,
               vdslLineMCMConfProfileRxBandStop,
               vdslLineMCMConfProfileRxBandRowStatus,
               vdslLineMCMConfProfileTxPSDTone,
               vdslLineMCMConfProfileTxPSDPSD,
               vdslLineMCMConfProfileTxPSDRowStatus,
               vdslLineMCMConfProfileMaxTxPSDTone,
               vdslLineMCMConfProfileMaxTxPSDPSD,
               vdslLineMCMConfProfileMaxTxPSDRowStatus,
               vdslLineMCMConfProfileMaxRxPSDTone,
               vdslLineMCMConfProfileMaxRxPSDPSD,
               vdslLineMCMConfProfileMaxRxPSDRowStatus
               }
            STATUS     current
            DESCRIPTION
                "A collection of objects providing configuration
```

```
                information for a VDSL line based upon multiple
                carrier modulation modem."
        ::= { vdslLineExtMCMGroups 1 }

   END
```

5. Acknowledgments

This document contains many definitions taken from an early version of the VDSL MIB [RFC3728]. As such any credit for the text found within should be fully attributed to the authors of that document.

6. Security Considerations

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

- vdslLineMCMConfProfileTable,
- vdslLineMCMConfProfileTxWindowLength,
- vdslLineMCMConfProfileRowStatus,
- vdslLineMCMConfProfileTxBandTable,
- vdslLineMCMConfProfileTxBandStart,
- vdslLineMCMConfProfileTxBandStop,
- vdslLineMCMConfProfileTxBandRowStatus,
- vdslLineMCMConfProfileRxBandTable,
- vdslLineMCMConfProfileRxBandStart,
- vdslLineMCMConfProfileRxBandStop,
- vdslLineMCMConfProfileRxBandRowStatus,
- vdslLineMCMConfProfileTxPSDTable,
- vdslLineMCMConfProfileTxPSDTone,
- vdslLineMCMConfProfileTxPSDPSD,
- vdslLineMCMConfProfileTxPSDRowStatus,
- vdslLineMCMConfProfileMaxTxPSDTable
- vdslLineMCMConfProfileMaxTxPSDTone,
- vdslLineMCMConfProfileMaxTxPSDPSD,
- vdslLineMCMConfProfileMaxTxPSDRowStatus,
- vdslLineMCMConfProfileMaxRxPSDTable
- vdslLineMCMConfProfileMaxRxPSDTone,
- vdslLineMCMConfProfileMaxRxPSDPSD,
- vdslLineMCMConfProfileMaxRxPSDRowStatus

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.

Additionally, allowing write access to configuration data may allow an end-user to increase their service levels or affect other end-users in either a positive or negative manner. For this reason, the tables and objects listed above should be considered to contain sensitive information.

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability:

vdslLineMCMConfProfileTable,
vdslLineMCMConfProfileTxWindowLength,
vdslLineMCMConfProfileRowStatus,
vdslLineMCMConfProfileTxBandTable,
vdslLineMCMConfProfileTxBandStart,
vdslLineMCMConfProfileTxBandStop,
vdslLineMCMConfProfileTxBandRowStatus,
vdslLineMCMConfProfileRxBandTable,
vdslLineMCMConfProfileRxBandStart,
vdslLineMCMConfProfileRxBandStop,
vdslLineMCMConfProfileRxBandRowStatus,
vdslLineMCMConfProfileTxPSDTable,
vdslLineMCMConfProfileTxPSDTone,
vdslLineMCMConfProfileTxPSDPSD,
vdslLineMCMConfProfileTxPSDRowStatus,
vdslLineMCMConfProfileMaxTxPSDTable
vdslLineMCMConfProfileMaxTxPSDTone,
vdslLineMCMConfProfileMaxTxPSDPSD,
vdslLineMCMConfProfileMaxTxPSDRowStatus,
vdslLineMCMConfProfileMaxRxPSDTable
vdslLineMCMConfProfileMaxRxPSDTone,
vdslLineMCMConfProfileMaxRxPSDPSD,
vdslLineMCMConfProfileMaxRxPSDRowStatus

Read access of the physical band parameters may provide knowledge to an end-user that would allow malicious behavior, for example the application of an intentional interference on one or all of the physical bands in use.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPSec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB module.

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

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

7. IANA Considerations

The IANA has assigned the transmission value 229 to VDSL-LINE-EXT-MCM-MIB.

8. References

8.1. Normative References

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8.2. Informative References

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