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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

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 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 (DSL Forum) has been taken into consideration [DSLFR57].

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]

vdslExtMCM MIB MODULE-IDENTITY

LAST-UPDATED "200504280000Z" -- April 28, 2005

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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

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REVISION "200504280000Z" -- April 28, 2005

DESCRIPTION "Initial version, published as RFC 4070."

::= { transmission 229 }

vdslLineExtMCMmib OBJECT IDENTIFIER ::= { vdsExtMCMmib 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 }
```

vdsLineMCMConfProfileRowStatus 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."

::= { vdsLineMCMConfProfileEntry 2 }

vdsLineMCMConfProfileTxBandTable OBJECT-TYPE

SYNTAX SEQUENCE OF VdsLineMCMConfProfileTxBandEntry
 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."

::= { vdsLineExtMCMmibObjects 2 }

vdsLineMCMConfProfileTxBandEntry OBJECT-TYPE

SYNTAX VdsLineMCMConfProfileTxBandEntry
 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 { vdsLineConfProfileName,

```

        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

{	
vdsLineMCMConfProfileRxBandNumber	Unsigned32,
vdsLineMCMConfProfileRxBandStart	Unsigned32,
vdsLineMCMConfProfileRxBandStop	Unsigned32,
vdsLineMCMConfProfileRxBandRowStatus	RowStatus
}	

vdsLineMCMConfProfileRxBandNumber OBJECT-TYPE

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

vdsLineMCMConfProfileRxBandStart 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
 ::= { vdsLineMCMConfProfileRxBandEntry 2 }

vdsLineMCMConfProfileRxBandStop 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
 ::= { vdsLineMCMConfProfileRxBandEntry 3 }

vdsLineMCMConfProfileRxBandRowStatus 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,

vdsLineMCMConfProfileTxPSDTone	Unsigned32,
vdsLineMCMConfProfileTxPSDPSD	Unsigned32,
vdsLineMCMConfProfileTxPSDRowStatus	RowStatus
}	

vdsLineMCMConfProfileTxPSDNumber OBJECT-TYPE

SYNTAX Unsigned32 (1..4096)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The index for this mask descriptor entry."

::= { vdsLineMCMConfProfileTxPSDEntry 1 }

vdsLineMCMConfProfileTxPSDTone 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

::= { vdsLineMCMConfProfileTxPSDEntry 2 }

vdsLineMCMConfProfileTxPSDPSD 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

::= { vdsLineMCMConfProfileTxPSDEntry 3 }

vdsLineMCMConfProfileTxPSDRowStatus 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

vdsLineExtMCMConformance OBJECT IDENTIFIER ::=
    { vdsLineExtMCMmib 2 }
vdsLineExtMCMGroups OBJECT IDENTIFIER ::=
    { vdsLineExtMCMConformance 1 }
vdsLineExtMCMCompliances OBJECT IDENTIFIER ::=
    { vdsLineExtMCMConformance 2 }

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

    ::= { vdsLineExtMCMCompliances 1 }

-- units of conformance

vdsLineExtMCMGroup OBJECT-GROUP
    OBJECTS
    {
        vdsLineMCMConfProfileTxWindowLength,
        vdsLineMCMConfProfileRowStatus,
        vdsLineMCMConfProfileTxBandStart,
        vdsLineMCMConfProfileTxBandStop,
        vdsLineMCMConfProfileTxBandRowStatus,
        vdsLineMCMConfProfileRxBandStart,
        vdsLineMCMConfProfileRxBandStop,
        vdsLineMCMConfProfileRxBandRowStatus,
        vdsLineMCMConfProfileTxPSDTone,
        vdsLineMCMConfProfileTxPSDPSD,
        vdsLineMCMConfProfileTxPSDRowStatus,
        vdsLineMCMConfProfileMaxTxPSDTone,
        vdsLineMCMConfProfileMaxTxPSDPSD,
        vdsLineMCMConfProfileMaxTxPSDRowStatus,
        vdsLineMCMConfProfileMaxRxPSDTone,
        vdsLineMCMConfProfileMaxRxPSDPSD,
        vdsLineMCMConfProfileMaxRxPSDRowStatus
    }
    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

- [RFC3415] Wijnen, B., Presuhn, R., and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", STD 62, RFC 3415, December 2002.

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