Definitions of Managed Objects for
High Bit-Rate DSL - 2nd generation (HDSL2) and
Single-Pair High-Speed Digital Subscriber Line (SHDSL) Lines

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 Management Information Base (MIB) module for
use with network management protocols in the Internet community. In
particular, it describes objects used for managing High Bit-Rate
Digital Subscriber Line (DSL) - 2nd generation (HDSL2) and
Single-Pair High-Speed Digital Subscriber Line (SHDSL) interfaces.
This document introduces extensions to several objects and textual
conventions defined in HDSL2-SHDSL-Line MIB (RFC 3276). This
document obsoletes RFC 3276.
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].

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

2. Overview

This document defines a Management Information Base (MIB) module for use with network management protocols in the Internet community for the purpose of managing HDSL2/SHDSL lines.
The MIB module described in RFC 3276 [RFC3276] describes objects used for managing High Bit-Rate DSL - 2nd generation (HDSL2) [T1E1.4] and Single-Pair High-Speed Digital Subscriber Line (SHDSL) interfaces [G.991.2]. These object descriptions are based upon the specifications for the HDSL2 and SHDSL Embedded Operations Channel (EOC), as defined in the American National Standards Institute (ANSI) T1E1.4/2000-006 [T1E1.4] and International Telecommunication Union (ITU) G.991.2 [G.991.2].

This document obsoletes RFC 3276 [RFC3276], which supports G.shdsl in that the MIB module described herein supports G.shdsl.bis as described in the G.991.2 [G.991.2]. In addition, objects have been added to improve the management of SHDSL lines.

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 to Other MIBs

This section outlines the relationship of this MIB module with other MIB modules described in RFCs. Specifically, the IF-MIB, as presented in RFC 2863 [RFC2863], is discussed.

2.1.1. General IF-MIB Integration (RFC 2863)

The HDSL2/SHDSL line MIB specifies the detailed attributes of a data interface. As such, it needs to integrate with RFC 2863 [RFC2863]. The IANA has assigned the following ifTypes to HDSL2 and SHDSL:

```
IANAifType ::= TEXTUAL-CONVENTION

... INTEGER {
  ... hdsl2 (168), -- High Bit-Rate DSL, 2nd generation
  ... shdsl (169), -- Multirate HDSL
  ...
}
```

Note that the ifFixedLengthGroup from RFC 2863 [RFC2863] MUST be supported and that the ifRcvAddressGroup does not apply to this MIB module.

2.1.2. Usage of ifTable

The MIB branch identified by this ifType contains tables appropriate for this interface type. Most such tables extend the ifEntry table and are indexed by ifIndex. For interfaces in systems implementing
this MIB module, those table entries indexed by ifIndex MUST be persistent.

The following attributes are part of the mandatory ifGeneralInformationGroup in RFC 2863 [RFC2863] and are not duplicated in the HDSL2/SHDSL line MIB.

===================================================================

ifIndex                  Interface index.
ifDescr                  See interfaces MIB [RFC2863].
ifType                   hdsl2(168) or shdsl(169).
ifSpeed                  Set as appropriate.
                         (This is fixed at 1552000 for HDSL2 lines)
ifPhysAddress            This object MUST have an octet string with zero length.
ifAdminStatus            See interfaces MIB [RFC2863].
ifOperStatus             See interfaces MIB [RFC2863].
ifLastChange             See interfaces MIB [RFC2863].
ifName                   See interfaces MIB [RFC2863].
ifAlias                  See interfaces MIB [RFC2863].
ifLinkUpDownTrapEnable   Default to enabled(1).
ifHighSpeed              Set as appropriate.
                         (For HDSL2 lines, this is fixed at 2)
ifConnectorPresent       Set as appropriate.
===================================================================

Figure 1: Use of ifTable Objects

2.2. IANA Considerations

The HDSL2-SHDSL-LINE-MIB module requires the allocation of a single object identifier for its MODULE-IDENTITY. The IANA has allocated this object identifier in the transmission subtree (48), defined in the SNMPv2-SMI MIB module.
The assignment was in fact done when RFC 3276 was published, and this revision of the RFC does not require any new action from IANA.

2.3. Conventions Used in the MIB Module

2.3.1. Naming Conventions

A. xtuC refers to a central site terminal unit;
   H2TU-C for HDSL2, or STU-C for SHDSL.

B. xtuR refers to a remote site terminal unit;
   H2TU-R for HDSL2, or STU-R for SHDSL.

C. xtu refers to a terminal unit; either an xtuC or xtuR.

D. xru refer to a regenerator unit;
   H2RU for HDSL2, or SRU for SHDSL.

E. xU refers to any HDSL2/SHDSL unit; either an xtu or xru.

F. CRC is Cyclic Redundancy Check [G.991.2].

G. ES means Errored Second [G.991.2].

H. LOSW means Loss of Sync Word [G.991.2].

I. LOSWS means LOSW Seconds [G.991.2].

J. SES means Severely Errored Second [G.991.2].

K. SNR means Signal-to-Noise Ratio [G.991.2].

L. UAS means Unavailable Second [G.991.2].

2.3.2. Textual Conventions

The following textual conventions are defined to reflect the line topology in the MIB module (further discussed in the following section) and to define the behavior of the statistics to be maintained by an agent.

- **Hdsl2ShdslUnitId:**
  Attributes with this syntax uniquely identify each unit in an HDSL2/SHDSL span. It mirrors the EOC addressing mechanism:

  - xtuC(1) - central office (CO) terminal unit
  - xtuR(2) - customer premises equipment (CPE) terminal unit
  - xru1(3) .. xru8(10) - regenerators, numbered from central office side

- **Hdsl2ShdslUnitSide:**
  Attributes with this syntax reference the two sides of a unit:

  - networkSide(1) - N in figure 2, below
  - customerSide(2) - C in figure 2, below
o Hdsl2ShdslWirePair:

Attributes with this syntax reference the wire pairs connecting the units:

- wirePair1(1) - First pair for HDSL2/SHDSL.
- wirePair2(2) - Optional second pair for SHDSL only.
- wirePair3(3) - Optional third pair for SHDSL.bis only.
- wirePair4(4) - Optional fourth pair for SHDSL.bis only.

o Hdsl2ShdslTransmissionModeType:

Attributes with this syntax specify the regional setting for an SHDSL line. Specified as a BITS construct, the two mode types are:

- region1 - ITU-T G.991.2 Annex A
- region2 - ITU-T G.991.2 Annex B

o Hdsl2ShdslPerfCurrDayCount:

Attributes with this syntax define the behavior of the 1-day (24 hour) gauges found in the MIB module.

o Hdsl2Shdsl1DayIntervalCount:

Attributes with this syntax define the behavior of the 1-day (24 hour) interval counters found in the MIB module.

o Hdsl2ShdslPerfTimeElapsed:

Attributes with this syntax define the behavior of the elapsed time counters found in the MIB module.

o Hdsl2ShdslPerfIntervalThreshold:

Attributes with this syntax define the behavior of the alarm thresholds found in the MIB module.

o Hdsl2ShdslClockReferenceType:

Attributes with this syntax define the clock references for the HDSL2/SHDSL span.
2.4. Structure

The MIB module is structured into the following MIB groups:

- **Span Configuration Group:**
  
  This group supports MIB objects for configuring parameters for the HDSL2/SHDSL span. It contains the following table:

  - hdsl2ShdslSpanConfTable

- **Span Status Group:**
  
  This group supports MIB objects for retrieving span status information. It contains the following table:

  - hdsl2ShdslSpanStatusTable

- **Unit Inventory Group:**
  
  This group supports MIB objects for retrieving unit inventory information about units in HDSL2/SHDSL lines via the EOC. It contains the following table:

  - hdsl2ShdslInventoryTable

- **Segment Endpoint Configuration Group:**
  
  This group supports MIB objects for configuring parameters for the HDSL2/SHDSL segment endpoints. It contains the following table:

  - hdsl2ShdslEndpointConfTable

- **Segment Endpoint Current Status/Performance Group:**
  
  This group supports MIB objects that provide the current status/performance information relating to segment endpoints. It contains the following table:

  - hdsl2ShdslEndpointCurrTable

- **Segment Endpoint 15-Minute Interval Status/Performance Group:**
  
  This group supports MIB objects that provide historic status/performance information relating to segment endpoints in 15-minute intervals. It contains the following table:

  - hdsl2Shdsl15MinIntervalTable
o Segment Endpoint 1-Day Interval Status/Performance Group:

This group supports MIB objects that provide historic status/performance information relating to segment endpoints in 1-day intervals. It contains the following table:

- hdsl2Shdsl1DayIntervalTable

o Maintenance Group:

This group supports MIB objects for performing maintenance operations such as loopbacks for HDSL2/SHDSL lines. It contains the following table(s):

- hdsl2Shdsl1EndpointMaintTable
- hdsl2Shdsl1UnitMaintTable

o Span Configuration Profile Group:

This group supports MIB objects for defining configuration profiles for HDSL2/SHDSL spans. It contains the following table:

- hdsl2ShdslSpanConfProfileTable

o Segment Endpoint Alarm Configuration Profile Group:

This group supports MIB objects for defining alarm configuration profiles for HDSL2/SHDSL segment endpoints. It contains the following table:

- hdsl2Shdsl1EndpointAlarmConfProfileTable

o Notifications Group:

This group defines the notifications supported for HDSL2/SHDSL lines:

- hdsl2ShdslLoopAttenCrossing
- hdsl2Shdsl1SNRMarginCrossing
- hdsl2Shdsl1PerfESThresh
- hdsl2Shdsl1PerfSESThresh
- hdsl2Shdsl1PerfCRCAnomaliesThresh
- hdsl2Shdsl1PerfLOSSThresh
- hdsl2Shdsl1PerfUASThresh
- hdsl2ShdslSpanInvalidNumRepeaters
- hdsl2ShdslLoopbackFailure
- hdsl2ShdslPowerBackoff
- hdsl2ShdslDeviceFault
- hds12Shdsl1dcContinuityFault
- hds12ShdslconfigInitFailure
- hds12ShdslprotocolInitFailure
- hds12ShdslnoNeighborPresent
- hds12ShdslLocalPowerLoss

o SHDSL Wire Pair Group:

This group supports MIB objects that provide status of the SHDSL-specific wire pairs.

- hds12ShdslEndpointCurrTipRingReversal
- hds12ShdslEndpointCurrActivationState

o Payload Group:

This group supports MIB objects for retrieving payload rates that exclude any framing overhead.

- hds12ShdslStatusMaxAttainablePayloadRate
- hds12ShdslStatusActualPayloadRate

2.5. Line Topology

An HDSL2/SHDSL line consists of a minimum of two units: xtuC (the central termination unit) and an xtuR (the remote termination unit). The line may optionally support up to 8 repeater/regenerator units (xru) as shown in the figure below.
2.6. Counters, Interval Buckets, and Thresholds

For SNR Margin, Loop Attenuation, ES, SES, CRC anomalies, LOSW, and UAS, there are event counters, current 15-minute and 0 to 96 15-minute history bucket(s) of "interval-counters", as well as current and 0 to 30 previous 1-day interval-counter(s). Each current 15-minute event bucket has an associated threshold notification.

Unlike RFC 3593 [RFC3593] and RFC 2662 [RFC2662], there is no representation in the MIB module for invalid buckets. In those cases where the data for an interval is suspect or known to be invalid, the agent MUST NOT report the interval. If the current 15-minute event bucket is determined to be invalid, notifications based upon the value of the event bucket MUST NOT be generated.

Not reporting an interval will result in holes in the associated table. For example, the table hds12Shdsl15MinIntervalTable is indexed by (ifIndex, hds12Shdsl1InvIndex, hds12ShdslEndPointSide, hds12ShdslEndPointWirePair, hds12Shdsl15MinIntervalNumber). If interval 12 is determined to be invalid but intervals 11 and 13 are valid, a Get Next operation on the indices .1.1.1.11 would return indices .1.1.1.13.

There is no requirement for an agent to ensure a fixed relationship between the start of a 15-minute interval and any wall clock; however, some implementations may align the 15-minute intervals with
quarter hours. Likewise, an implementation may choose to align 1-day intervals with the start of a day.

Counters are not reset when an xU is reinitialized, only when the agent is reset or reinitialized (or under specific request outside the scope of this MIB module).

2.7. Profiles

As a managed node can handle a large number of xUs (e.g., hundreds or perhaps thousands of lines), provisioning every parameter on every xU may become burdensome. Moreover, most lines are provisioned identically with the same set of parameters. To simplify the provisioning process, this MIB module makes use of profiles. A profile is a set of parameters that can be shared by multiple lines using the same configuration.

The following profiles are used in this MIB module:

- **Span Configuration Profiles** - Span configuration profiles contain parameters for configuring HDSL2/SHDSL spans. They are defined in the hdsl2ShdslSpanConfProfileTable. Since span configuration parameters are only applicable for SHDSL, the support for span configuration profiles is optional for HDSL2 interfaces.

  Note that the configuration of the span dictates the behavior for each individual segment endpoint in the span. If a different configuration is provisioned for any given segment endpoint within the span, the new configuration for this segment endpoint will override the span configuration for this segment endpoint only.

- **Segment Endpoint Alarm Configuration Profiles** - These profiles contain parameters for configuring alarm thresholds for HDSL2/SHDSL segment endpoints. These profiles are defined in the hdsl2ShdslEndpointAlarmConfProfileTable.

  The index value for this profile is a locally-unique administratively-assigned name for the profile having the textual convention ‘SnmpAdminString’ (RFC 3411 [RFC3411]).

One or more lines may be configured to share parameters of a single profile (e.g., hdsl2ShdslEndpointAlarmConfProfile = ‘silver’) by setting its hdsl2ShdslEndpointAlarmConfProfile objects to the value of this profile. If a change is made to the profile, all lines that refer to it will be reconfigured to the changed parameters. Before a profile can be deleted or taken out of service, it must be first unreferenced from all associated lines.
Implementations MUST provide a default profile whose name is ‘DEFVAL’ for each profile type. The values of the associated parameters will be vendor specific unless otherwise indicated in this document. Before a line’s profiles have been set, these profiles will be automatically used by setting hdl2ShdslEndpointAlarmConfProfile and hdl2ShdslSpanConfProfile to ‘DEFVAL’ where appropriate. This default profile name, ‘DEFVAL’, is considered reserved in the context of profiles defined in this MIB module.

Profiles are created, assigned, and deleted dynamically using the profile name and profile row status in each of the four profile tables.

Profile changes MUST take effect immediately. These changes MAY result in a restart (hard reset or soft restart) of the units on the line.

2.8. Notifications

The ability to generate the SNMP notifications coldStart/warmStart (per [RFC3418]), which are per agent (e.g., per Digital Subscriber Line Access Multiplexer, or DSLAM, in such a device), and linkUp/linkDown (per [RFC2863]), which are per interface (i.e., HDSL2/SHDSL line) is required.

A linkDown notification MAY be generated whenever any ES, SES, CRC anomaly, LOSW, or UAS event occurs. The corresponding linkUp notification MAY be sent when all link failure conditions are cleared.

The notifications defined in this MIB module are for initialization failure and for the threshold crossings associated with the following events: ES, SES, CRC anomaly, LOSW, and UAS. Each threshold has its own enable/threshold value. When that value is 0, the notification is disabled.

The hdl2ShdslEndpointCurrStatus is a bitmask representing all outstanding error conditions associated with a particular segment endpoint. Note that since the status of remote endpoints is obtained via the EOC, this information may be unavailable for units that are unreachable via EOC during a line error condition. Therefore, not all conditions may always be included in its current status. Notifications corresponding to the bit fields in this object are defined.

Two alarm conditions, SNR Margin Alarm and Loop Attenuation Alarm, are organized in a manner slightly different from that implied in the EOC specifications. In the MIB module, these alarm conditions are
tied to the two thresholds, hdsl2ShdslEndpointThreshSNRMargin and 
hdsl2ShdslEndpointThreshLoopAttenuation, found in the 
hdsl2ShdslEndpointAlarmConfProfileTable. In the EOC, the alarm 
conditions associated with these thresholds are per unit. In the MIB 
module, these alarm conditions are per endpoint. For terminal units, 
this has no impact. For repeaters, this implies an implementation 
variance where the agent in the terminal unit is responsible for 
detecting a threshold crossing. As the reporting of a repeater 
detected alarm condition to the polling terminal unit occurs in the 
same EOC message as the reporting of the current SNR Margin and Loop 
Attenuation values, it is anticipated that this will have very little 
impact on agent implementation.

A threshold notification occurs whenever the corresponding current 
15-minute interval error counter becomes equal to, or exceeds, the 
threshold value. Only one notification SHOULD be sent per interval 
per interface. Since the current 15-minute counter is reset to 0 
every 15 minutes, and if the condition persists, the notification may 
recur as often as every 15 minutes. For example, to get a 
notification whenever a "loss of" event occurs (but at most once 
every 15 minutes), set the corresponding threshold to 1. The agent 
will generate a notification when the event originally occurs.

Notifications, other than the threshold notifications listed above, 
SHOULD be rate limited (throttled) such that there is at least a 
1-minute gap between the generation of consecutive notifications of 
the same event. When notifications are rate limited, they are 
dropped and not queued for sending at a future time. This is 
intended to be a general rate-limiting statement for notifications 
that have no explicit rate-limiting assertions in this document 
otherwise.

Note that the Network Management System, or NMS, may receive a 
linkDown notification as well, if enabled (via ifLinkUpDownTrapEnable 
[RFC2863]). At the beginning of the next 15-minute interval, the 
counter is reset. When the first second goes by and the event 
occurs, the current interval bucket will be 1, which equals the 
threshold, and the notification will be sent again.

An hdsl2ShdslSpanInvalidNumRepeaters notification may be generated 
following completion of the discovery phase if the number of 
repeaters discovered on the line differs from the number of repeaters 
specified in hdsl2ShdslSpanConfNumRepeaters. For those conditions 
where the number of provisioned repeaters is greater than those 
encountered during span discovery, all table entries associated with 
the nonexistent repeaters are to be discarded. For those conditions 
where the number of provisioned repeaters is less than those
encountered during span discovery, additional table entries are to be created using the default span configuration profile.

3. Definitions

HDSL2-SHDSL-LINE-MIB DEFINITIONS ::= BEGIN

IMPORTS
  MODULE-IDENTITY,
  OBJECT-TYPE,
  Counter32,
  Unsigned32,
  Gauge32,
  NOTIFICATION-TYPE,
  Integer32,
  transmission
  FROM SNMPv2-SMI
  RowStatus,
  TEXTUAL-CONVENTION
  FROM SNMPv2-TC
  ifIndex
  FROM IF-MIB
  PerfCurrentCount,
  PerfIntervalCount
  FROM PerfHist-TC-MIB
  SnmpAdminString
  FROM SNMP-FRAMEWORK-MIB
  MODULE-COMPLIANCE,
  OBJECT-GROUP,
  NOTIFICATION-GROUP
  FROM SNMPv2-CONF;

hdsl2ShdslMIB MODULE-IDENTITY
LAST-UPDATED "200512070000Z" -- December 7, 2005
ORGANIZATION "ADSLMIB Working Group"
CONTACT-INFO "WG-email:  adslmib@ietf.org
WG-URL:
Info: https://www1.ietf.org/mailman/listinfo/adslmib
Chair: Mike Sneed
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Co-Chair Bob Ray
PESA Switching Systems, Inc.
DESCRIPTION

“This MIB module defines a collection of objects for managing HDSL2/SHDSL lines. An agent may reside at either end of the line; however, the MIB module is designed to require no management communication between the modems beyond that inherent in the low-level EOC line protocol as defined in ANSI T1E1.4/2000-006 (for HDSL2 lines) or in ITU G.991.2 (for SHDSL lines).

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REVISION "200512070000Z" -- December 7, 2005
DESCRIPTION "This version, published as RFC 4319.

The following changes have been made in this version:
1. Added a 3rd and 4th wire pair.
2. Modified all rates such that their rates are only constrained by an unsigned 32-bit value and not by what today’s perceived technology limitations are.
3. Clarified that the rates from RFC 3276 include payload and any applicable framing and added objects for payload-only rates.
4. Added an object to indicate whether the tip and ring are reversed on a wire pair.
5. Added an object to display the activation state of a wire pair.
6. Added references as necessary for clarification.
7. Added display hints to textual conventions as necessary.
8. Updated conformance statements as necessary.
9. Some changes were due to IETF requirements and RFC generation tools.

REVISION "200205090000Z" -- May 9, 2002
DESCRIPTION "Initial version, published as RFC 3276."

::= { transmission 48 }

hdsl2ShdslMibObjects OBJECT IDENTIFIER ::= { hdsl2ShdslMIB 1 }

-- Textual Conventions used in this MIB module

Hdsl2ShdslPerfCurrDayCount ::= TEXTUAL-CONVENTION
   DISPLAY-HINT "d"
   STATUS  current
   DESCRIPTION
   "A gauge associated with interface performance measurements in a
    current 1-day (24 hour) measurement interval.

    The value of this gauge starts at zero at the beginning of an
    interval and is increased when associated events occur, until
    the end of the 1-day interval. At that time, the value of the
    gauge is stored in the previous 1-day history interval, as
    defined in a companion object of type
    Hdsl2Shdsl1DayIntervalCount, and the current interval gauge
    is restarted at zero.

    In the case where the agent has no valid data available for
    this interval, the corresponding object instance is not
    available, and upon a retrieval request, a corresponding error
    message shall be returned to indicate that this instance does
    not exist. Please note that zero is a valid value."
   SYNTAX  Gauge32

Hdsl2Shdsl1DayIntervalCount ::= TEXTUAL-CONVENTION
   DISPLAY-HINT "d"
STATUS current

DESCRIPTION
"A counter associated with interface performance measurements during the most previous 1-day (24 hour) measurement interval. The value of this gauge is equal to the value of the current day gauge, as defined in a companion object of type Hdsl2ShdslPerfCurrDayCount, at the end of its most recent interval.

In the case where the agent has no valid data available for this interval, the corresponding object instance is not available, and upon a retrieval request, a corresponding error message shall be returned to indicate that this instance does not exist."

SYNTAX Gauge32

Hdsl2ShdslPerfTimeElapsed ::= TEXTUAL-CONVENTION
DISPLAY-HINT "d"
STATUS current

DESCRIPTION
"The number of seconds that have elapsed since the beginning of the current measurement period. If, for some reason, such as an adjustment in the system’s time-of-day clock or the addition of a leap second, the current interval exceeds the maximum value, the agent will return the maximum value.

For 15-minute intervals, the range is limited to (0..899). For 24-hour intervals, the range is limited to (0..86399)."

SYNTAX Unsigned32(0..86399)

Hdsl2ShdslPerfIntervalThreshold ::= TEXTUAL-CONVENTION
DISPLAY-HINT "d"
STATUS current

DESCRIPTION
"This convention defines a range of values that may be set in a fault threshold alarm control. As the number of seconds in a 15-minute interval numbers at most 900, objects of this type may have a range of 0...900, where the value of 0 disables the alarm."

SYNTAX Unsigned32(0..900)

Hdsl2ShdslUnitId ::= TEXTUAL-CONVENTION
STATUS current

DESCRIPTION
"This is the unique identification for all units in an HDSL2/SHDSL span. It is based on the EOC unit addressing scheme with reference to the xtuC."

SYNTAX INTEGER
Hdsl2ShdslUnitSide ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION
"This is the referenced side of an HDSL2/SHDSL unit - Network or Customer side. The side facing the Network is the Network side, while the side facing the Customer is the Customer side."
SYNTAX INTEGER
{ networkSide(1),
customerSide(2) }

Hdsl2ShdslWirePair ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION
"This is the referenced pair of wires in an HDSL2/SHDSL segment. HDSL2 only supports a single pair (wirePair1 or two wire), SHDSL lines support an optional second pair (wirePair2 or four wire), and G.shdsl.bis support an optional third pair (wirePair3 or six wire) and an optional fourth pair (wirePair4 or eight wire)."
SYNTAX INTEGER
{ wirePair1(1), -- two wire
wirePair2(2), -- four wire
wirePair3(3), -- six wire
wirePair4(4) -- eight wire }

Hdsl2ShdslTransmissionModeType ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION
"Contains the regional setting of the HDSL2/SHDSL span, represented as a bit-map of possible settings. The various bit positions are as follows:
Bit   Meaning       Description
1     region 1     Indicates ITU-T G.991.2 Annex A.
2     region 2     Indicates ITU-T G.991.2 Annex B.

SYNTAX    BITS
           { region1(0),
             region2(1)
           }

Hdsl2ShdslClockReferenceType ::= TEXTUAL-CONVENTION
STATUS    current
DESCRIPTION
"The various STU-C symbol clock references for the
HDSL2/SHDSL span, represented as an enumeration."
SYNTAX    INTEGER
           { localClk(1),          -- Mode-1 per G991.2
             networkClk(2),        -- Mode-2 per G991.2
             dataOrNetworkClk(3),  -- Mode-3a per G991.2
             dataClk(4)            -- Mode-3b per G991.2
           }

-- Span Configuration Group

--

hdsl2ShdslSpanConfTable OBJECT-TYPE
SYNTAX     SEQUENCE OF Hdsl2ShdslSpanConfEntry
MAX-ACCESS not-accessible
STATUS     current

DESCRIPTION
"This table supports overall configuration of HDSL2/SHDSL
spans. Entries in this table MUST be maintained in a
persistent manner."
 ::= { hdsl2ShdslMibObjects 1 }

hdsl2ShdslSpanConfEntry OBJECT-TYPE
SYNTAX     Hdsl2ShdslSpanConfEntry
MAX-ACCESS not-accessible
STATUS     current

DESCRIPTION
"An entry in the hdsl2ShdslSpanConfTable. Each entry
represents the complete span in a single HDSL2/SHDSL line.
It is indexed by the ifIndex of the associated HDSL2/SHDSL
line."
INDEX { ifIndex }
 ::= { hdsl2ShdslSpanConfTable 1 }
Hdsl2ShdslSpanConfEntry ::=  
SEQUENCE  
{  
  hdsl2ShdslSpanConfNumRepeaters Unsigned32,  
  hdsl2ShdslSpanConfProfile SnmpAdminString,  
  hdsl2ShdslSpanConfAlarmProfile SnmpAdminString  
}  

hdsl2ShdslSpanConfNumRepeaters OBJECT-TYPE  
SYNTAX Unsigned32(0..8)  
UNITS "repeaters"  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION  
"This object provisions the number of repeaters/regenerators  
in this HDSL2/SHDSL span."  
 ::= { hdsl2ShdslSpanConfEntry 1 }  

hdsl2ShdslSpanConfProfile OBJECT-TYPE  
SYNTAX SnmpAdminString (SIZE(1..32))  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION  
"This object is a pointer to a span configuration profile in  
the hdsl2ShdslSpanConfProfileTable, which applies to this  
span. The value of this object is the index of the referenced  
profile in the hdsl2ShdslSpanConfProfileTable. Note that span  
configuration profiles are only applicable to SHDSL lines.  
HDSL2 lines MUST reference the default profile, 'DEFVAL'.  
By default, this object will have the value 'DEFVAL'  
(the index of the default profile).  
Any attempt to set this object to a value that is not the value  
of the index for an active entry in the profile table,  
hdsl2ShdslSpanConfProfileTable, MUST be rejected."  
 ::= { hdsl2ShdslSpanConfEntry 2 }  

hdsl2ShdslSpanConfAlarmProfile OBJECT-TYPE  
SYNTAX SnmpAdminString (SIZE(1..32))  
MAX-ACCESS read-write  
STATUS current  
DESCRIPTION  
"This object is a pointer to an alarm configuration profile in  
the hdsl2ShdslEndpointAlarmConfProfileTable. The value of  
this object is the index of the referenced profile in the  
hdsl2ShdslEndpointAlarmConfProfileTable. The alarm  
threshold configuration in the referenced profile will be
used by default for all segment endpoints in this span. Individual endpoints may override this profile by explicitly specifying some other profile in the hds12Shds1EndpointConfTable. By default, this object will have the value ‘DEFVAL’ (the index of the default profile).

Any attempt to set this object to a value that is not the value of the index for an active entry in the profile table, hds12Shds1EndpointAlarmConfProfileTable, MUST be rejected.

::= { hds12Shds1SpanConfEntry 3 }

-- Span Status Group
--

hds12Shds1SpanStatusTable OBJECT-TYPE
SYNTAX      SEQUENCE OF Hds12Shds1SpanStatusEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
"This table provides overall status information of HDSL2/SHDSL spans. This table contains live data from equipment. As such, it is NOT persistent."
::= { hds12Shds1MibObjects 2 }

hds12Shds1SpanStatusEntry OBJECT-TYPE
SYNTAX      Hds12Shds1SpanStatusEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
"An entry in the hds12Shds1SpanStatusTable. Each entry represents the complete span in a single HDSL2/SHDSL line. It is indexed by the ifIndex of the associated HDSL2/SHDSL line."
INDEX { ifIndex }
::= { hds12Shds1SpanStatusTable 1 }

Hds12Shds1SpanStatusEntry ::= SEQUENCE
{
  hds12Shds1StatusNumAvailRepeaters         Unsigned32,
  hds12Shds1StatusMaxAttainableLineRate     Unsigned32,
  hds12Shds1StatusActualLineRate            Unsigned32,
  hds12Shds1StatusTransmissionModeCurrent   Hds12Shds1TransmissionModeType,
  hds12Shds1StatusMaxAttainablePayloadRate  Unsigned32,
  hds12Shds1StatusActualPayloadRate         Unsigned32
}
hdsl2ShdslStatusNumAvailRepeaters OBJECT-TYPE
SYNTAX      Unsigned32(0..8)
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"Contains the actual number of repeaters/regenerators
discovered in this HDSL2/SHDSL span."
 ::= { hdsl2ShdslSpanStatusEntry 1 }

hdsl2ShdslStatusMaxAttainableLineRate OBJECT-TYPE
SYNTAX      Unsigned32(0..4294967295)
UNITS       "bps"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"Contains the maximum attainable line rate in this HDSL2/SHDSL
span. This object provides the maximum rate the line is
capable of achieving. This is based upon measurements made
during line probing. This rate includes payload (user data)
and any applicable framing overhead."
 ::= { hdsl2ShdslSpanStatusEntry 2 }

hdsl2ShdslStatusActualLineRate OBJECT-TYPE
SYNTAX      Unsigned32(0..4294967295)
UNITS       "bps"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"Contains the actual line rate in this HDSL2/SHDSL span. This
SHOULD equal ifSpeed. This rate includes payload (user data)
and any applicable framing overhead"
 ::= { hdsl2ShdslSpanStatusEntry 3 }

hdsl2ShdslStatusTransmissionModeCurrent OBJECT-TYPE
SYNTAX      Hdsl2ShdslTransmissionModeType
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"Contains the current Power Spectral Density (PSD) regional
setting of the HDSL2/SHDSL span."
 ::= { hdsl2ShdslSpanStatusEntry 4 }

hdsl2ShdslStatusMaxAttainablePayloadRate OBJECT-TYPE
SYNTAX      Unsigned32(0..4294967295)
UNITS       "bps"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"Contains the maximum attainable payload (user data) line rate in this HDSL2/SHDSL span. This object provides the maximum rate the line is capable of achieving. This is based upon measurements made during line probing. Any framing overhead is not included."

::= { hdsl2ShdslSpanStatusEntry 5 }

hdsl2ShdslStatusActualPayloadRate OBJECT-TYPE
SYNTAX      Unsigned32(0..4294967295)
UNITS       "bps"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"Contains the actual line rate in this HDSL2/SHDSL span. Any framing overhead is not included."

::= { hdsl2ShdslSpanStatusEntry 6 }

-- Unit Inventory Group
--

hdsl2ShdslInventoryTable OBJECT-TYPE
SYNTAX     SEQUENCE OF Hdsl2ShdslInventoryEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"This table supports retrieval of unit inventory information available via the EOC from units in an HDSL2/SHDSL line. Entries in this table are dynamically created during the line discovery process. The life cycle for these entries is as follows:

- xtu discovers a device, either a far-end xtu or an xru
- an inventory table entry is created for the device
- the line goes down for whatever reason
- inventory table entries for unreachable devices are destroyed

As these entries are created/destroyed dynamically, they are NOT persistent."

::= { hdsl2ShdslMibObjects 3 }

hdsl2ShdslInventoryEntry OBJECT-TYPE
SYNTAX      Hdsl2ShdslInventoryEntry
MAX-ACCESS  not-accessible
STATUS     current
DESCRIPTION
"An entry in the hdsl2ShdslInventoryTable. Each entry
represents inventory information for a single unit in an
HDSL2/SHDSL line. It is indexed by the ifIndex of the
HDSL2/SHDSL line and the Hds12ShdslUnitId of the
associated unit."
INDEX { ifIndex, hds12ShdslInvIndex }
::= { hds12ShdslInventoryTable 1 }

Hds12ShdslInventoryEntry ::= SEQUENCE
    {
        hds12ShdslInvIndex                      Hdsl2ShdslUnitId,
        hds12ShdslInvVendorID                   OCTET STRING,
        hds12ShdslInvVendorModelNumber          OCTET STRING,
        hds12ShdslInvVendorSerialNumber         OCTET STRING,
        hds12ShdslInvVendorEOCSoftwareVersion   Integer32,
        hds12ShdslInvVendorStandardVersion      Integer32,
        hds12ShdslInvVendorListNumber           OCTET STRING,
        hds12ShdslInvVendorIssueNumber          OCTET STRING,
        hds12ShdslInvVendorSoftwareVersion      OCTET STRING,
        hds12ShdslInvVendorOther                OCTET STRING,
        hds12ShdslInvTransmissionModeCapability
            Hds12ShdslTransmissionModeType
    }

hds12ShdslInvIndex OBJECT-TYPE
SYNTAX     Hds12ShdslUnitId
MAX-ACCESS not-accessible
STATUS      current
DESCRIPTION
    "Each entry in this table corresponds to a physical element
    in an HDSL2/SHDSL span. It is based on the EOC unit addressing
    scheme with reference to the xtuC."
::= { hds12ShdslInventoryEntry 1 }

hds12ShdslInvVendorID OBJECT-TYPE
SYNTAX     OCTET STRING(SIZE(8))
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
    "Vendor ID as reported in an Inventory Response message."
REFERENCE
    "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID
    130, Octets 25-32."
::= { hds12ShdslInventoryEntry 2 }

hds12ShdslInvVendorModelNumber OBJECT-TYPE
SYNTAX     OCTET STRING(SIZE(12))
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Vendor model number as reported in an Inventory Response message."
REFERENCE "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID 130, Octets 33-44."
 ::= { hdsl2ShdslInventoryEntry 3 }

hdsl2ShdslInvVendorSerialNumber OBJECT-TYPE
SYNTAX OCTET STRING(SIZE(12))
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Vendor serial number as reported in an Inventory Response message."
REFERENCE "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID 130, Octets 45-56."
 ::= { hdsl2ShdslInventoryEntry 4 }

hdsl2ShdslInvVendorEOCSoftwareVersion OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Vendor EOC version as reported in a Discovery Response message."
REFERENCE "G.991.2, Section 9.5.5.7.2, Discovery response - Message ID 129, Octet 12."
 ::= { hdsl2ShdslInventoryEntry 5 }

hdsl2ShdslInvStandardVersion OBJECT-TYPE
SYNTAX Integer32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Version of the HDSL2/SHDSL standard implemented, as reported in an Inventory Response message."
REFERENCE "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID 130, Octet 2."
 ::= { hdsl2ShdslInventoryEntry 6 }

hdsl2ShdslInvVendorListNumber OBJECT-TYPE
SYNTAX OCTET STRING(SIZE(3))
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION  "Vendor list number as reported in an Inventory Response message."
REFERENCE   "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID 130, Octets 3-5."
 ::= { hdsl2ShdslInventoryEntry 7 }

hdsl2ShdslInvVendorIssueNumber OBJECT-TYPE
SYNTAX      OCTET STRING(SIZE(2))
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION  "Vendor issue number as reported in an Inventory Response message."
REFERENCE   "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID 130, Octets 6-7."
 ::= { hdsl2ShdslInventoryEntry 8 }

hdsl2ShdslInvVendorSoftwareVersion OBJECT-TYPE
SYNTAX      OCTET STRING(SIZE(6))
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION  "Vendor software version as reported in an Inventory Response message."
REFERENCE   "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID 130, Octets 8-13."
 ::= { hdsl2ShdslInventoryEntry 9 }

hdsl2ShdslInvEquipmentCode OBJECT-TYPE
SYNTAX      OCTET STRING(SIZE(10))
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION  "Equipment code conforming to ANSI T1.213, Coded Identification of Equipment Entities."
REFERENCE   "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID 130, Octets 14-23."
 ::= { hdsl2ShdslInventoryEntry 10 }

hdsl2ShdslInvVendorOther OBJECT-TYPE
SYNTAX      OCTET STRING(SIZE(12))
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION  "Other vendor information as reported in an Inventory Response
message."
REFERENCE    "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID
130, Octets 57-68."
::= { hds12ShdslInventoryEntry 11 }

-- Segment Endpoint Configuration Group
--

hds12ShdslEndpointConfTable OBJECT-TYPE
SYNTAX      SEQUENCE OF Hdsl2ShdslEndpointConfEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION  "This table supports configuration parameters for segment
endpoints in an HDSL2/SHDSL line. As this table is indexed
by ifIndex, it MUST be maintained in a persistent manner."
::= { hds12ShdslMibObjects 4 }

Hdsl2ShdslEndpointConfEntry OBJECT-TYPE
SYNTAX      Hdsl2ShdslEndpointConfEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION  "An entry in the hds12ShdslEndpointConfTable. Each entry
represents a single segment endpoint in an HDSL2/SHDSL line.
It is indexed by the ifIndex of the HDSL2/SHDSL line, the
UnitId of the associated unit, the side of the unit, and the
wire pair of the associated modem."
INDEX      { ifIndex, hds12ShdslInvIndex, hds12ShdslEndpointSide,
              hds12ShdslEndpointWirePair}
::= { hds12ShdslEndpointConfTable 1 }
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hdsl2ShdslEndpointSide OBJECT-TYPE
SYNTAX      Hds12ShdslUnitSide
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION  
"The side of the unit associated with this segment endpoint -- 
Network/Customer side -- as per the Hds12ShdslUnitSide textual 
convention."
::= { hdsl2ShdslEndpointConfEntry 1 }

hdsl2ShdslEndpointWirePair OBJECT-TYPE
SYNTAX      Hds12ShdslWirePair
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION  
"The wire pair of the modem associated with this segment 
endpoint as per the Hds12ShdslWirePair textual convention."
::= { hdsl2ShdslEndpointConfEntry 2 }

hdsl2ShdslEndpointAlarmConfProfile OBJECT-TYPE
SYNTAX      SnmpAdminString (SIZE(0..32))
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION  
"This object configures the alarm threshold values to be used 
for this segment endpoint. The values are obtained from the 
alarm configuration profile referenced by this object. The 
value of this object is the index of the referenced profile in 
the hdsl2ShdslEndpointAlarmConfProfileTable, or NULL (a 
zero-length SnmpAdminString). If the value is a zero-length 
SnmpAdminString, the endpoint uses the default Alarm 
Configuration Profile for the associated span as per the 
hdsl2ShdslSpanConfAlarmProfile object in the 
hdsl2ShdslSpanConfTable. The default value of this object is 
a zero-length SnmpAdminString.

Any attempt to set this object to a value that is not the value 
of the index for an active entry in the profile table, 
hdsl2ShdslEndpointAlarmConfProfileTable, MUST be rejected."
::= { hdsl2ShdslEndpointConfEntry 3 }

-- Segment Endpoint Current Status/Performance Group
--
hdsl2ShdslEndpointCurrTable OBJECT-TYPE
SYNTAX SEQUENCE OF Hdsl2ShdslEndpointCurrEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "This table contains current status and performance information for segment endpoints in HDSL2/SHDSL lines. As with other tables in this MIB module indexed by ifIndex, entries in this table MUST be maintained in a persistent manner."
::= { hdsl2ShdslMibObjects 5 }

hdsl2ShdslEndpointCurrEntry OBJECT-TYPE
SYNTAX Hdsl2ShdslEndpointCurrEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "An entry in the hdsl2ShdslEndpointCurrTable. Each entry contains status and performance information relating to a single segment endpoint. It is indexed by the ifIndex of the HDSL2/SHDSL line, the UnitId of the associated unit, the side of the unit, and the wire pair of the associated modem."
INDEX { ifIndex, hdsl2ShdslInvIndex, hdsl2ShdslEndpointSide, hdsl2ShdslEndpointWirePair }
::= { hdsl2ShdslEndpointCurrTable 1 }

Hdsl2ShdslEndpointCurrEntry ::= SEQUENCE
{
  hdsl2ShdslEndpointCurrAtn                Integer32,
  hdsl2ShdslEndpointCurrSnrMgn             Integer32,
  hdsl2ShdslEndpointCurrStatus             BITS,
  hdsl2ShdslEndpointES                     Counter32,
  hdsl2ShdslEndpointSES                    Counter32,
  hdsl2ShdslEndpointCRCanomalies           Counter32,
  hdsl2ShdslEndpointLOSWS                  Counter32,
  hdsl2ShdslEndpointUAS                    Counter32,
  hdsl2ShdslEndpointCurr15MinTimeElapsed   Hdsl2ShdslPerfTimeElapsed,
  hdsl2ShdslEndpointCurr15MinES            PerfCurrentCount,
  hdsl2ShdslEndpointCurr15MinSES           PerfCurrentCount,
  hdsl2ShdslEndpointCurr15MinCRCanomalies  PerfCurrentCount,
  hdsl2ShdslEndpointCurr15MinLOSWS         PerfCurrentCount,
  hdsl2ShdslEndpointCurr15MinUAS           PerfCurrentCount,
  hdsl2ShdslEndpointCurr1DayTimeElapsed    Hdsl2ShdslPerfTimeElapsed,
  hdsl2ShdslEndpointCurr1DayES             Hdsl2ShdslPerfCurrDayCount,
  hdsl2ShdslEndpointCurr1DaySES            Hdsl2ShdslPerfCurrDayCount
}
Hds12ShdslPerfCurrDayCount,
hds12ShdslEndpointCurr1DayCRCanomalies
Hds12ShdslPerfCurrDayCount,
hds12ShdslEndpointCurr1DayLOSWS
Hds12ShdslPerfCurrDayCount,
hds12ShdslEndpointCurr1DayUAS
Hds12ShdslPerfCurrDayCount,
hds12ShdslEndpointCurrTipRingReversal INTEGER,
hds12ShdslEndpointCurrActivationState INTEGER
}

hds12ShdslEndpointCurrAtn OBJECT-TYPE
SYNTAX Integer32(-127..128)
UNITS "dB"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The current loop attenuation for this endpoint as reported in a
Network or Customer Side Performance Status message."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hds12ShdslEndpointCurrEntry 1 }

hds12ShdslEndpointCurrSnrMgn OBJECT-TYPE
SYNTAX Integer32(-127..128)
UNITS "dB"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The current SNR margin for this endpoint as reported in a
Status Response/SNR message."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hds12ShdslEndpointCurrEntry 2 }

hds12ShdslEndpointCurrStatus OBJECT-TYPE
SYNTAX BITS
(
  noDefect(0),
  powerBackoff(1),
  deviceFault(2),
  dcContinuityFault(3),
  snrMarginAlarm(4),
  loopAttenuationAlarm(5),
  loswFailureAlarm(6),
  configInitFailure(7),
  protocolInitFailure(8),
  noNeighborPresent(9),
  loopbackActive(10)
)
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION  "Contains the current state of the endpoint. This is a
bit-map of possible conditions. The various bit positions
are as follows:

  noDefect    There are no defects on the line.
  powerBackoff Indicates enhanced Power Backoff.
  deviceFault Indicates that a vendor-dependent
diagnostic or self-test fault
    has been detected.
  dcContinuityFault Indicates vendor-dependent
    conditions that interfere with
    span powering such as short and
    open circuits.
  snrMarginAlarm Indicates that the SNR margin
    has dropped below the alarm threshold.
  loopAttenuationAlarm Indicates that the loop attenuation
    exceeds the alarm threshold.
  loswFailureAlarm Indicates a forward LOSW alarm.
  configInitFailure Endpoint failure during initialization
    due to paired endpoint not able to
    support requested configuration.
  protocolInitFailure Endpoint failure during initialization
    due to incompatible protocol used by
    the paired endpoint.
  noNeighborPresent Endpoint failure during initialization
    due to no activation sequence detected
    from paired endpoint.
  loopbackActive   A loopback is currently active at this
                   segment endpoint.

This is intended to supplement ifOperStatus. Note that there
is a 1:1 relationship between the status bits defined in this
object and the notification thresholds defined elsewhere in
this MIB module."
REFERENCE    "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 3 }

hdsl2ShdslEndpointES OBJECT-TYPE
SYNTAX Counter32
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Count of Errored Seconds (ES) on this endpoint since the xU was last restarted."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 4 }

hdsl2ShdslEndpointSES OBJECT-TYPE
SYNTAX Counter32
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Count of Severely Errored Seconds (SES) on this endpoint since the xU was last restarted."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 5 }

hdsl2ShdslEndpointCRCanomalies OBJECT-TYPE
SYNTAX Counter32
UNITS "detected CRC Anomalies"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Count of CRC anomalies on this endpoint since the xU was last restarted."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 6 }

hdsl2ShdslEndpointLOSWS OBJECT-TYPE
SYNTAX Counter32
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Count of Loss of Sync Word (LOSW) Seconds on this endpoint since the xU was last restarted."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 7 }

hdsl2ShdslEndpointUAS OBJECT-TYPE
SYNTAX Counter32
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Count of Unavailable Seconds (UAS) on this endpoint since the xU was last restarted."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"

::= { hdsl2ShdslEndpointCurrEntry 8 }

hdsl2ShdslEndpointCurr15MinTimeElapsed OBJECT-TYPE
SYNTAX Hdsl2ShdslPerfTimeElapsed
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Total elapsed seconds in the current 15-minute interval."

::= { hdsl2ShdslEndpointCurrEntry 9 }

hdsl2ShdslEndpointCurr15MinES OBJECT-TYPE
SYNTAX PerfCurrentCount
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Count of Errored Seconds (ES) in the current 15-minute interval."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"

::= { hdsl2ShdslEndpointCurrEntry 10 }

hdsl2ShdslEndpointCurr15MinSES OBJECT-TYPE
SYNTAX PerfCurrentCount
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Count of Severely Errored Seconds (SES) in the current 15-minute interval."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"

::= { hdsl2ShdslEndpointCurrEntry 11 }

hdsl2ShdslEndpointCurr15MinCRCAnomalies OBJECT-TYPE
SYNTAX PerfCurrentCount
UNITS "detected CRC Anomalies"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Count of CRC anomalies in the current 15-minute interval."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 12 }

hdsl2ShdslEndpointCurr15MinLOSWS OBJECT-TYPE
SYNTAX       PerfCurrentCount
UNITS        "seconds"
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION   "Count of Loss of Sync Word (LOSW) Seconds in the current
15-minute interval."
REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 13 }

hdsl2ShdslEndpointCurr15MinUAS OBJECT-TYPE
SYNTAX       PerfCurrentCount
UNITS        "seconds"
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION   "Count of Unavailable Seconds (UAS) in the current 15-minute
interval."
REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 14 }

hdsl2ShdslEndpointCurr1DayTimeElapsed OBJECT-TYPE
SYNTAX       Hdsl2ShdslPerfTimeElapsed
UNITS        "seconds"
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION   "Number of seconds that have elapsed since the beginning of
the current 1-day interval."
::= { hdsl2ShdslEndpointCurrEntry 15 }

hdsl2ShdslEndpointCurr1DayES OBJECT-TYPE
SYNTAX       Hdsl2ShdslPerfCurrDayCount
UNITS        "seconds"
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION   "Count of Errored Seconds (ES) during the current day as
measured by hdsl2ShdslEndpointCurr1DayTimeElapsed."
REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 16 }

hdsl2ShdslEndpointCurr1DaySES OBJECT-TYPE
SYNTAX       Hdsl2ShdslPerfCurrDayCount
UNITS        "seconds"
MAX-ACCESS  read-only
STATUS         current
DESCRIPTION    "Count of Severely Errored Seconds (SES) during the current
day as measured by hdsl2ShdslEndpointCurr1DayTimeElapsed."
REFERENCE      "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 17 }

hdsl2ShdslEndpointCurr1DayCRCanomalies OBJECT-TYPE
SYNTAX         Hds12ShdslPerfCurrDayCount
UNITS          "detected CRC Anomalies"
MAX-ACCESS     read-only
STATUS         current
DESCRIPTION    "Count of CRC anomalies during the current day as measured
by hdsl2ShdslEndpointCurr1DayTimeElapsed."
REFERENCE      "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 18 }

hdsl2ShdslEndpointCurr1DayLOSWS OBJECT-TYPE
SYNTAX         Hds12ShdslPerfCurrDayCount
UNITS          "seconds"
MAX-ACCESS     read-only
STATUS         current
DESCRIPTION    "Count of Loss of Sync Word (LOSW) Seconds during the current
day as measured by hdsl2ShdslEndpointCurr1DayTimeElapsed."
REFERENCE      "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 19 }

hdsl2ShdslEndpointCurr1DayUAS OBJECT-TYPE
SYNTAX         Hds12ShdslPerfCurrDayCount
UNITS          "seconds"
MAX-ACCESS     read-only
STATUS         current
DESCRIPTION    "Count of Unavailable Seconds (UAS) during the current day as
measured by hdsl2ShdslEndpointCurr1DayTimeElapsed."
REFERENCE      "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2ShdslEndpointCurrEntry 20 }

hdsl2ShdslEndpointCurrTipRingReversal OBJECT-TYPE
SYNTAX         INTEGER
{ normal(1),
  reversed(2) }
MAX-ACCESS     read-only
This object indicates the state of the tip/ring for the wire pair.

::= { hdsl2ShdslEndpointCurrEntry 21 }

hdsl2ShdslEndpointCurrActivationState OBJECT-TYPE
SYNTAX INTEGER
{ preActivation(1), -- PreTrain
  activation(2), -- Training
  data(3)        -- Trained
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION "This object indicates the activation or training state of the wire pair."
REFERENCE "ITU-T G.991.2, Section 6.2 PMD Activation Sequence"
::= { hdsl2ShdslEndpointCurrEntry 22 }

-- Segment Endpoint 15-Minute Interval Status/Performance Group

hdsl2Shdsl15MinIntervalTable OBJECT-TYPE
SYNTAX SEQUENCE OF Hdsl2Shdsl15MinIntervalEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "This table provides one row for each HDSL2/SHDSL endpoint performance data collection interval. This table contains live data from equipment. As such, it is NOT persistent."
::= { hdsl2ShdslMibObjects 6 }

hdsl2Shdsl15MinIntervalEntry OBJECT-TYPE
SYNTAX Hdsl2Shdsl15MinIntervalEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "An entry in the hdsl2Shdsl15MinIntervalTable."
INDEX { ifIndex, hdsl2Shdsl1InvIndex, hdsl2ShdslEndpointSide,
  hdsl2ShdslEndpointWirePair, hdsl2Shdsl15MinIntervalNumber }
::= { hdsl2Shdsl15MinIntervalTable 1 }

Hdsl2Shdsl15MinIntervalEntry ::= SEQUENCE
{
  hdsl2Shdsl15MinIntervalNumber Unsigned32,
hdsl2Shdsl15MinIntervalES OBJECT-TYPE
SYNTAX PerfIntervalCount
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Count of Errored Seconds (ES) during the interval."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2Shdsl15MinIntervalEntry 2 }

hdsl2Shdsl15MinIntervalSES OBJECT-TYPE
SYNTAX PerfIntervalCount
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Count of Severely Errored Seconds (SES) during the interval."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2Shdsl15MinIntervalEntry 3 }

hdsl2Shdsl15MinIntervalCRCAnomalies OBJECT-TYPE
SYNTAX PerfIntervalCount
UNITS "detected CRC Anomalies"
MAX-ACCESS read-only
STATUS current
DESCRIPTION "Count of CRC anomalies during the interval."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2Shdsl15MinIntervalEntry 4 }

hdsl2Shdsl15MinIntervalLOSWS OBJECT-TYPE
SYNTAX        PerfIntervalCount
UNITS         "seconds"
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION   "Count of Loss of Sync Word (LOSW) Seconds during the
               interval."
REFERENCE     "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2Shdsl15MinIntervalEntry 5 }

hdsl2Shdsl15MinIntervalUAS OBJECT-TYPE
SYNTAX        PerfIntervalCount
UNITS         "seconds"
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION   "Count of Unavailable Seconds (UAS) during the interval."
REFERENCE     "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2Shdsl15MinIntervalEntry 6 }

-- Segment Endpoint 1-Day Interval Status/Performance Group --

hdsl2Shdsl1DayIntervalTable OBJECT-TYPE
SYNTAX        SEQUENCE OF Hdsl2Shdsl1DayIntervalEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION   "This table provides one row for each HDSL2/SHDSL endpoint
               performance data collection interval. This table contains
               live data from equipment. As such, it is NOT persistent."
::= { hdsl2ShdslMibObjects 7 }

hdsl2Shdsl1DayIntervalEntry OBJECT-TYPE
SYNTAX        Hdsl2Shdsl1DayIntervalEntry
MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION   "An entry in the hdsl2Shdsl1DayIntervalTable."
INDEX { ifIndex, hdsl2Shdsl1InvIndex, hdsl2ShdslEndpointSide,
         hdsl2ShdslEndpointWirePair, hdsl2Shdsl1DayIntervalNumber }
::= { hdsl2Shdsl1DayIntervalTable 1 }

Hdsl2Shdsl1DayIntervalEntry ::= SEQUENCE
  {
    hdsl2Shdsl1DayIntervalNumber         Unsigned32,
    hdsl2Shdsl1DayIntervalMoniSecs       Hdsl2ShdslPerfTimeElapsed,
  }
hdsl2Shdsl1DayIntervalES OBJECT-TYPE
SYNTAX       Hdsl2Shdsl1DayIntervalCount
UNITS        "seconds"
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION   
"Count of Errored Seconds (ES) during the 1-day interval as measured by hdsl2Shdsl1DayIntervalMoniSecs."
REFERENCES    "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2Shdsl1DayIntervalEntry 3 }

hdsl2Shdsl1DayIntervalSES OBJECT-TYPE
SYNTAX       Hdsl2Shdsl1DayIntervalCount
UNITS        "seconds"
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION   
"Count of Severely Errored Seconds (SES) during the 1-day interval as measured by hdsl2Shdsl1DayIntervalMoniSecs.


time in the 1-day interval over which the performance monitoring information is actually counted. This value will be the same as the interval duration except in a situation where performance monitoring data could not be collected for any reason."
interval as measured by hdsl2Shdsl1DayIntervalMoniSecs."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2Shdsl1DayIntervalEntry 4 }

hdsl2Shdsl1DayIntervalCRCAnomalies OBJECT-TYPE
SYNTAX       Hdsl2Shdsl1DayIntervalCount
UNITS        "detected CRC Anomalies"
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
 "Count of CRC anomalies during the 1-day interval as
 measured by hdsl2Shdsl1DayIntervalMoniSecs."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2Shdsl1DayIntervalEntry 5 }

hdsl2Shdsl1DayIntervalLOSWs OBJECT-TYPE
SYNTAX       Hdsl2Shdsl1DayIntervalCount
UNITS        "seconds"
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
 "Count of Loss of Sync Word (LOSW) Seconds during the 1-day
 interval as measured by hdsl2Shdsl1DayIntervalMoniSecs."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2Shdsl1DayIntervalEntry 6 }

hdsl2Shdsl1DayIntervalUAS OBJECT-TYPE
SYNTAX       Hdsl2Shdsl1DayIntervalCount
UNITS        "seconds"
MAX-ACCESS   read-only
STATUS       current
DESCRIPTION
 "Count of Unavailable Seconds (UAS) during the 1-day interval
 as measured by hdsl2Shdsl1DayIntervalMoniSecs."
REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
::= { hdsl2Shdsl1DayIntervalEntry 7 }

-- Maintenance Group
--

hdsl2ShdslEndpointMaintTable OBJECT-TYPE
SYNTAX      SEQUENCE OF Hdsl2ShdslEndpointMaintEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
 "This table supports maintenance operations (e.g., loopbacks)
 to be performed on HDSL2/SHDSL segment endpoints. This table
 contains live data from equipment. As such, it is NOT
persistent."
::= { hdsl2ShdslMibObjects 8 }

hdsl2ShdslEndpointMaintEntry OBJECT-TYPE
SYNTAX      Hdsl2ShdslEndpointMaintEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
"An entry in the hdsl2ShdslEndpointMaintTable. Each entry
corresponds to a single segment endpoint and is indexed by the
ifIndex of the HDSL2/SHDSL line, the UnitId of the associated
unit, and the side of the unit."
INDEX { ifIndex, hdsl2ShdslInvIndex, hdsl2ShdslEndpointSide }
::= { hdsl2ShdslEndpointMaintTable 1 }

Hdsl2ShdslEndpointMaintEntry ::= SEQUENCE
{
  hdsl2ShdslMaintLoopbackConfig      INTEGER,
  hdsl2ShdslMaintTipRingReversal     INTEGER,
  hdsl2ShdslMaintPowerBackOff        INTEGER,
  hdsl2ShdslMaintSoftRestart         INTEGER
}

hdsl2ShdslMaintLoopbackConfig OBJECT-TYPE
SYNTAX      INTEGER
  { noLoopback(1),
    normalLoopback(2),
    specialLoopback(3)
  }
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
"This object controls configuration of loopbacks for the
associated segment endpoint. The status of the loopback
is obtained via the hdsl2ShdslEndpointCurrStatus object."
::= { hdsl2ShdslEndpointMaintEntry 1 }

hdsl2ShdslMaintTipRingReversal OBJECT-TYPE
SYNTAX      INTEGER
  { normal(1),
    reversed(2)
  }
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
"This object indicates the state of the tip/ring pair at the associated segment endpoint."
 ::= { hdsl2ShdslEndpointMaintEntry 2 }

hdsl2ShdslMaintPowerBackOff OBJECT-TYPE
SYNTAX      INTEGER
            { default(1),
              enhanced(2) }
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
 "This object configures the receiver at the associated segment endpoint to operate in default or enhanced power backoff mode."
 ::= { hdsl2ShdslEndpointMaintEntry 3 }

hdsl2ShdslMaintSoftRestart OBJECT-TYPE
SYNTAX      INTEGER
            { ready(1),
              restart(2) }
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
 "This object enables the manager to trigger a soft restart of the modem at the associated segment endpoint. The manager may only set this object to the ‘restart(2)’ value, which initiates a restart. The agent will perform a restart after approximately 5 seconds. Following the 5 second period, the agent will restore the object to the ‘ready(1)’ state."
 ::= { hdsl2ShdslEndpointMaintEntry 4 }

hdsl2ShdslUnitMaintTable OBJECT-TYPE
SYNTAX      SEQUENCE OF Hdsl2ShdslUnitMaintEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
 "This table supports maintenance operations for units in a HDSL2/SHDSL line. Entries in this table MUST be maintained in a persistent manner."
 ::= { hdsl2ShdslMibObjects 9 }

hdsl2ShdslUnitMaintEntry OBJECT-TYPE
SYNTAX      Hdsl2ShdslUnitMaintEntry

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An entry in the hdsl2ShdslUnitMaintTable. Each entry corresponds to a single unit and is indexed by the ifIndex of the HDSL2/SHDSL line and the UnitId of the associated unit.

INDEX { ifIndex, hdsl2ShdslInvIndex }
::= { hdsl2ShdslUnitMaintTable 1 }

Hdsl2ShdslUnitMaintEntry ::= SEQUENCE {
  hdsl2ShdslMaintLoopbackTimeout     Integer32,
  hdsl2ShdslMaintUnitPowerSource     INTEGER
}

hdsl2ShdslMaintLoopbackTimeout OBJECT-TYPE
SYNTAX      Integer32(0..4095)
UNITS       "minutes"
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
  "This object configures the timeout value for loopbacks initiated at segments endpoints contained in the associated unit. A value of 0 disables the timeout."
::= { hdsl2ShdslUnitMaintEntry 1 }

hdsl2ShdslMaintUnitPowerSource OBJECT-TYPE
SYNTAX      INTEGER
             { local(1),
               span(2) }
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
  "This object indicates the DC power source being used by the associated unit."
::= { hdsl2ShdslUnitMaintEntry 2 }

-- Span Configuration Profile Group
--

hdsl2ShdslSpanConfProfileTable OBJECT-TYPE
SYNTAX      SEQUENCE OF Hdsl2ShdslSpanConfProfileEntry
MAX-ACCESS  not-accessible
STATUS      current
This table supports definitions of span configuration profiles for SHDSL lines. HDSL2 does not support these configuration options. This table MUST be maintained in a persistent manner.

::= { hdsl2ShdslMibObjects 10 }

hdsl2ShdslSpanConfProfileEntry OBJECT-TYPE
SYNTAX   Hdsl2ShdslSpanConfProfileEntry
MAX-ACCESS not-accessible
STATUS    current
DESCRIPTION
"Each entry corresponds to a single span configuration profile. Each profile contains a set of span configuration parameters. The configuration parameters in a profile are applied to those lines referencing that profile (see the hdsl2ShdslSpanConfProfile object). Profiles may be created/deleted using the row creation/deletion mechanism via hdsl2ShdslSpanConfProfileRowStatus. If an active entry is referenced in hdsl2ShdslSpanConfProfile, the entry MUST remain active until all references are removed."
INDEX  { IMPLIED hdsl2ShdslSpanConfProfileName }
 ::= { hdsl2ShdslSpanConfProfileTable 1 }

Hdsl2ShdslSpanConfProfileEntry ::= SEQUENCE
{  
  hdsl2ShdslSpanConfProfileName SnmpAdminString,
  hdsl2ShdslSpanConfWireInterface INTEGER,
  hdsl2ShdslSpanConfMinLineRate Unsigned32,
  hdsl2ShdslSpanConfMaxLineRate Unsigned32,
  hdsl2ShdslSpanConfPSD INTEGER,
  Hdsl2ShdslTransmissionModeType
  hdsl2ShdslSpanConfTransmissionMode
  hdsl2ShdslSpanConfRemoteEnabled INTEGER,
  hdsl2ShdslSpanConfPowerFeeding INTEGER,
  hdsl2ShdslSpanConfCurrCondTargetMarginDown Integer32,
  hdsl2ShdslSpanConfWorstCaseTargetMarginDown Integer32,
  hdsl2ShdslSpanConfCurrCondTargetMarginUp Integer32,
  hdsl2ShdslSpanConfWorstCaseTargetMarginUp Integer32,
  hdsl2ShdslSpanConfUsedTargetMargins BITS,
  hdsl2ShdslSpanConfReferenceClock
  Hdsl2ShdslClockReferenceType,
  hdsl2ShdslSpanConfLineProbeEnable INTEGER,
  hdsl2ShdslSpanConfProfileRowStatus RowStatus
}

hdsl2ShdslSpanConfProfileName OBJECT-TYPE
SYNTAX SnmpAdminString (SIZE(1..32))
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "This object is the unique index associated with this profile. Entries in this table are referenced via the object hdsl2ShdslSpanConfProfile in Hdsl2ShdslSpanConfEntry."
 ::= { hdsl2ShdslSpanConfProfileEntry 1 }

hdsl2ShdslSpanConfWireInterface OBJECT-TYPE
SYNTAX INTEGER
{ twoWire(1),
  fourWire(2),
  sixWire(3),
  eightWire(4) }
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object configures the two-wire or optional four-wire, six-wire, or eight-wire operation for SHDSL lines."
DEFVAL { twoWire }
 ::= { hdsl2ShdslSpanConfProfileEntry 2 }

hdsl2ShdslSpanConfMinLineRate OBJECT-TYPE
SYNTAX Unsigned32(0..4294967295)
UNITs "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object configures the minimum transmission rate for the associated SHDSL Line in bits-per-second (bps) and includes both payload (user data) and any applicable framing overhead. If the minimum line rate equals the maximum line rate (hdsl2ShdslSpanMaxLineRate), the line rate is considered 'fixed'. If the minimum line rate is less than the maximum line rate, the line rate is considered 'rate-adaptive'."
DEFVAL { 1552000 }
 ::= { hdsl2ShdslSpanConfProfileEntry 3 }

hdsl2ShdslSpanConfMaxLineRate OBJECT-TYPE
SYNTAX Unsigned32(0..4294967295)
UNITs "bps"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This object configures the maximum transmission rate for the associated SHDSL Line in bits-per-second (bps) and includes both payload (user data) and any applicable framing overhead. If the minimum line rate equals the maximum line rate (hdsl2ShdslSpanMaxLineRate), the line rate is considered 'fixed'. If the minimum line rate is less than the maximum line rate, the line rate is considered 'rate-adaptive'."

DEFVAL { 1552000 }
::= { hdsl2ShdslSpanConfProfileEntry 4 }

hdsl2ShdslSpanConfPSD OBJECT-TYPE
SYNTAX INTEGER
{ symmetric(1), asymmetric(2) }
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object configures use of symmetric/asymmetric PSD (Power Spectral Density) Mask for the associated SHDSL Line. Support for symmetric PSD is mandatory for all supported data rates. Support for asymmetric PSD is optional."
DEFVAL { symmetric }
::= { hdsl2ShdslSpanConfProfileEntry 5 }

hdsl2ShdslSpanConfTransmissionMode OBJECT-TYPE
SYNTAX Hds12ShdslTransmissionModeType
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object specifies the regional setting for the SHDSL line."
DEFVAL { { region1 } }
::= { hdsl2ShdslSpanConfProfileEntry 6 }

hdsl2ShdslSpanConfRemoteEnabled OBJECT-TYPE
SYNTAX INTEGER
{ enabled(1), disabled(2) }
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object enables/disables support for remote management of the units in an SHDSL line from the STU-R via the EOC."
DEFVAL { enabled } ::= { hdsl2ShdslSpanConfProfileEntry 7 }

hdsl2ShdslSpanConfPowerFeeding OBJECT-TYPE
SYNTAX INTEGER
{ noPower(1), powerFeed(2), wettingCurrent(3) }
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object enables/disables support for optional power feeding in an SHDSL line."
DEFVAL { noPower } ::= { hdsl2ShdslSpanConfProfileEntry 8 }

hdsl2ShdslSpanConfCurrCondTargetMarginDown OBJECT-TYPE
SYNTAX Integer32(-10..21)
UNITS "dB"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object specifies the downstream current condition target SNR margin for an SHDSL line. The SNR margin is the difference between the desired SNR and the actual SNR. Target SNR margin is the desired SNR margin for a unit."
DEFVAL { 0 } ::= { hdsl2ShdslSpanConfProfileEntry 9 }

hdsl2ShdslSpanConfWorstCaseTargetMarginDown OBJECT-TYPE
SYNTAX Integer32(-10..21)
UNITS "dB"
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object specifies the downstream worst-case target SNR margin for an SHDSL line. The SNR margin is the difference between the desired SNR and the actual SNR. Target SNR margin is the desired SNR margin for a unit."
DEFVAL { 0 } ::= { hdsl2ShdslSpanConfProfileEntry 10 }

hdsl2ShdslSpanConfCurrCondTargetMarginUp OBJECT-TYPE
SYNTAX Integer32(-10..21)
UNITS "dB"
MAX-ACCESS read-create
STATUS       current
DESCRIPTION   "This object specifies the upstream current-condition target
SNR margin for an SHDSL line. The SNR margin is the difference
between the desired SNR and the actual SNR. Target SNR margin
is the desired SNR margin for a unit."
DEFVAL        { 0 }
::= { hdsl2ShdslSpanConfProfileEntry 11 }

hdsl2ShdslSpanConfWorstCaseTargetMarginUp OBJECT-TYPE
SYNTAX        Integer32(-10..21)
UNITS         "dB"
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION   "This object specifies the upstream worst-case target SNR
margin for an SHDSL line. The SNR margin is the difference
between the desired SNR and the actual SNR. Target SNR margin
is the desired SNR margin for a unit."
DEFVAL        { 0 }
::= { hdsl2ShdslSpanConfProfileEntry 12 }

hdsl2ShdslSpanConfUsedTargetMargins OBJECT-TYPE
SYNTAX        BITS
{ currCondDown(0),
  worstCaseDown(1),
  currCondUp(2),
  worstCaseUp(3) }
MAX-ACCESS    read-create
STATUS        current
DESCRIPTION   "Indicates whether a target SNR margin is enabled or
disabled. This is a bit-map of possible settings. The
various bit positions are as follows:

currCondDown  - current-condition downstream target SNR
margin enabled

worstCaseDown - worst-case downstream target SNR margin
enabled

currCondUp   - current-condition upstream target SNR
margin enabled

worstCaseUp  - worst-case upstream target SNR margin
enabled."
DEFVAL { { currCondDown } }
::= { hds12ShdslSpanConfProfileEntry 13 }

hds12ShdslSpanConfReferenceClock OBJECT-TYPE
SYNTAX  Hds12ShdslClockReferenceType
MAX-ACCESS  read-create
STATUS  current
DESCRIPTION
"This object configures the clock reference for the STU-C in an SHDSL Line."
DEFVAL { localClk }
::= { hds12ShdslSpanConfProfileEntry 14 }

hds12ShdslSpanConfLineProbeEnable OBJECT-TYPE
SYNTAX  INTEGER
{ disable(1),
  enable(2)
}
MAX-ACCESS  read-create
STATUS  current
DESCRIPTION
"This object enables/disables support for Line Probe of the units in an SHDSL line. When Line Probe is enabled, the system performs Line Probing to find the best possible rate. If Line Probe is disabled, the rate adaptation phase is skipped to shorten set up time."
DEFVAL { disable }
::= { hds12ShdslSpanConfProfileEntry 15 }

hds12ShdslSpanConfProfileRowStatus OBJECT-TYPE
SYNTAX  RowStatus
MAX-ACCESS  read-create
STATUS  current
DESCRIPTION
"This object controls creation/deletion of the associated entry in this table per the semantics of RowStatus. If an active entry is referenced in hds12ShdslSpanConfProfile, the entry MUST remain active until all references are removed."
::= { hds12ShdslSpanConfProfileEntry 16 }

-- Segment Endpoint Alarm Configuration Profile group
--

hds12ShdslEndpointAlarmConfProfileTable OBJECT-TYPE
SYNTAX  SEQUENCE OF Hds12ShdslEndpointAlarmConfProfileEntry
MAX-ACCESS  not-accessible
STATUS  current
DESCRIPTION

"This table supports definitions of alarm configuration profiles for HDSL2/SHDSL segment endpoints. This table MUST be maintained in a persistent manner."

::= { hdsl2ShdslMibObjects 11 }

hdsl2ShdslendpointAlarmConfProfileEntry OBJECT-TYPE
SYNTAX      Hdsl2ShdslendpointAlarmConfProfileEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION

"Each entry corresponds to a single alarm configuration profile. Each profile contains a set of parameters for setting alarm thresholds for various performance attributes monitored at HDSL2/SHDSL segment endpoints. Profiles may be created/deleted using the row creation/deletion mechanism via hdsl2ShdslendpointAlarmConfProfileRowStatus. If an active entry is referenced in either hdsl2ShdslSpanConfAlarmProfile or hdsl2ShdslendpointAlarmConfProfile, the entry MUST remain active until all references are removed."

INDEX { IMPLIED hdsl2ShdslendpointAlarmConfProfileName }

::= { hdsl2ShdslendpointAlarmConfProfileTable 1 }

Hdsl2ShdslendpointAlarmConfProfileEntry ::= SEQUENCE

{ hdsl2ShdslendpointAlarmConfProfileName SnmpAdminString,
  hdsl2ShdslendpointThreshLoopAttenuation Integer32,
  hdsl2ShdslendpointThreshSNRMargin Integer32,
  hdsl2ShdslendpointThreshES Hdsl2ShdslPerfIntervalThreshold,
  hdsl2ShdslendpointThreshSES Hdsl2ShdslPerfIntervalThreshold,
  hdsl2ShdslendpointThreshCRCanomalies Integer32,
  hdsl2ShdslendpointThreshLOSWS Hdsl2ShdslPerfIntervalThreshold,
  hdsl2ShdslendpointThreshUAS Hdsl2ShdslPerfIntervalThreshold,
  hdsl2ShdslendpointAlarmConfProfileRowStatus RowStatus }

hdsl2ShdslendpointAlarmConfProfileName OBJECT-TYPE
SYNTAX      SnmpAdminString (SIZE(1..32))
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION

"This object is the unique index associated with this profile."

::= { hdsl2ShdslendpointAlarmConfProfileEntry 1 }
hdsl2ShdslEndpointThreshLoopAttenuation OBJECT-TYPE
SYNTAX       Integer32(-127..128)
UNITS        "dB"
MAX-ACCESS   read-create
STATUS       current
DESCRIPTION   
  "This object configures the loop attenuation alarm threshold.  
  When the current value of hdsl2ShdslEndpointCurrAtn reaches 
  or exceeds this threshold, an hdsl2ShdslLoopAttenCrossing 
  MAY be generated."
DEFVAL        { 0 }
 ::= { hdsl2ShdslEndpointAlarmConfProfileEntry 2 }

hdsl2ShdslEndpointThreshSNRMargin OBJECT-TYPE
SYNTAX       Integer32(-127..128)
UNITS        "dB"
MAX-ACCESS   read-create
STATUS       current
DESCRIPTION   
  "This object configures the SNR margin alarm threshold.  
  When the current value of hdsl2ShdslEndpointCurrSnrMgn 
  reaches or drops below this threshold, a 
  hdsl2ShdslSNRMarginCrossing MAY be generated."
DEFVAL        { 0 }
 ::= { hdsl2ShdslEndpointAlarmConfProfileEntry 3 }

hdsl2ShdslEndpointThreshES OBJECT-TYPE
SYNTAX       Hdsl2ShdslPerfIntervalThreshold
UNITS        "seconds"
MAX-ACCESS   read-create
STATUS       current
DESCRIPTION   
  "This object configures the threshold for the number of 
  Errored Seconds (ES) within any given 15-minute performance 
  data collection interval.  If the value of Errored Seconds 
  in a particular 15-minute collection interval reaches/ 
  exceeds this value, an hdsl2ShdslPerfESThresh MAY be 
  generated.  At most, one notification will be sent per 
  interval per endpoint."
DEFVAL        { 0 }
 ::= { hdsl2ShdslEndpointAlarmConfProfileEntry 4 }

hdsl2ShdslEndpointThreshSES OBJECT-TYPE
SYNTAX       Hdsl2ShdslPerfIntervalThreshold
UNITS        "seconds"
MAX-ACCESS   read-create
STATUS       current
DESCRIPTION   

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"This object configures the threshold for the number of Severely Errored Seconds (SES) within any given 15-minute performance data collection interval. If the value of Severely Errored Seconds in a particular 15-minute collection interval reaches/exceeds this value, an hdsl2ShdslPerfSESThresh MAY be generated. At most, one notification will be sent per interval per endpoint."
DEFVAL { 0 }
 ::= { hdsl2ShdslEndpointAlarmConfProfileEntry 5 }

hdsl2ShdslEndpointThreshCRCanomalies OBJECT-TYPE
SYNTAX    Integer32
UNITS     "detected CRC Anomalies"
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
 "This object configures the threshold for the number of CRC anomalies within any given 15-minute performance data collection interval. If the value of CRC anomalies in a particular 15-minute collection interval reaches/exceeds this value, an hdsl2ShdslPerfCRCanomaliesThresh MAY be generated. At most, one notification will be sent per interval per endpoint."
DEFVAL { 0 }
 ::= { hdsl2ShdslEndpointAlarmConfProfileEntry 6 }

hdsl2ShdslEndpointThreshLOSWS OBJECT-TYPE
SYNTAX    Hdsl2ShdslPerfIntervalThreshold
UNITS     "seconds"
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
 "This object configures the threshold for the number of Loss of Sync Word (LOSW) Seconds within any given 15-minute performance data collection interval. If the value of LOSW in a particular 15-minute collection interval reaches/exceeds this value, an hdsl2ShdslPerfLOSWSThresh MAY be generated. At most, one notification will be sent per interval per endpoint."
DEFVAL { 0 }
 ::= { hdsl2ShdslEndpointAlarmConfProfileEntry 7 }

hdsl2ShdslEndpointThreshUAS OBJECT-TYPE
SYNTAX    Hdsl2ShdslPerfIntervalThreshold
UNITS     "seconds"
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"This object configures the threshold for the number of Unavailable Seconds (UAS) within any given 15-minute performance data collection interval. If the value of UAS in a particular 15-minute collection interval reaches/exceeds this value, an hdsl2ShdslPerfUASThresh MAY be generated. At most, one notification will be sent per interval per endpoint."
DEFVAL { 0 }
::= { hdsl2ShdslEndpointAlarmConfProfileEntry 8 }

hdsl2ShdslEndpointAlarmConfProfileRowStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION "This object controls creation/deletion of the associated entry in this table as per the semantics of RowStatus. If an active entry is referenced in either hdsl2ShdslSpanConfAlarmProfile or hdsl2ShdslEndpointAlarmConfProfile, the entry MUST remain active until all references are removed."
::= { hdsl2ShdslEndpointAlarmConfProfileEntry 9 }

-- Notifications Group

--

hdsl2ShdslNotifications OBJECT IDENTIFIER ::= { hdsl2ShdslMIB 0 }

hdsl2ShdslLoopAttenCrossing NOTIFICATION-TYPE
OBJECTS
{ hdsl2ShdslEndpointCurrAtn, hdsl2ShdslEndpointThreshLoopAttenuation }
STATUS current
DESCRIPTION "This notification indicates that the loop attenuation threshold (as per the hdsl2ShdslEndpointThreshLoopAttenuation value) has been reached/exceeded for the HDSL2/SHDSL segment endpoint."
::= { hdsl2ShdslNotifications 1 }

hdsl2ShdslSNRMarginCrossing NOTIFICATION-TYPE
OBJECTS
{ hdsl2ShdslEndpointCurrSnrMgn, hdsl2ShdslEndpointThreshSNRMargin }

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DESCRIPTION
"This notification indicates that the SNR margin threshold (as per the hdsl2ShdslEndpointThreshSNRMargin value) has been reached/exceeded for the HDSL2/SHDSL segment endpoint."

::= { hdsl2ShdslNotifications 2 }

hdsl2ShdslPerfESThresh NOTIFICATION-TYPE
OBJECTS
{ hdsl2ShdslEndpointCurr15MinES, hdsl2ShdslEndpointThreshES }

DESCRIPTION
"This notification indicates that the errored seconds threshold (as per the hdsl2ShdslEndpointThreshES value) has been reached/exceeded for the HDSL2/SHDSL segment endpoint."

::= { hdsl2ShdslNotifications 3 }

hdsl2ShdslPerfSESThresh NOTIFICATION-TYPE
OBJECTS
{ hdsl2ShdslEndpointCurr15MinSES, hdsl2ShdslEndpointThreshSES }

DESCRIPTION
"This notification indicates that the severely errored seconds threshold (as per the hdsl2ShdslEndpointThreshSES value) has been reached/exceeded for the HDSL2/SHDSL segment endpoint."

::= { hdsl2ShdslNotifications 4 }

hdsl2ShdslPerfCRCanomaliesThresh NOTIFICATION-TYPE
OBJECTS
{ hdsl2ShdslEndpointCurr15MinCRCanomalies, hdsl2ShdslEndpointThreshCRCanomalies }

DESCRIPTION
"This notification indicates that the CRC anomalies threshold (as per the hdsl2ShdslEndpointThreshCRCanomalies value) has been reached/exceeded for the HDSL2/SHDSL segment endpoint."

::= { hdsl2ShdslNotifications 5 }

hdsl2ShdslPerfLOSWSThresh NOTIFICATION-TYPE
OBJECTS
{
  hdsl2ShdslEndpointCurr15MinLOSWS,
  hdsl2ShdslEndpointThreshLOSWS
}

STATUS  current
DESCRIPTION
  "This notification indicates that the LOSW Seconds threshold
   (as per the hdsl2ShdslEndpointThreshLOSWS value) has been
   reached/exceeded for the HDSL2/SHDSL segment endpoint."
  ::= { hdsl2ShdslNotifications 6 }

hdsl2ShdslPerfUASThresh NOTIFY-TYPE
OBJECTS
{
  hdsl2ShdslEndpointCurr15MinUAS,
  hdsl2ShdslEndpointThreshUAS
}

STATUS  current
DESCRIPTION
  "This notification indicates that the unavailable seconds
   threshold (as per the hdsl2ShdslEndpointThreshUAS value) has
   been reached/exceeded for the HDSL2/SHDSL segment endpoint."
  ::= { hdsl2ShdslNotifications 7 }

hdsl2ShdslSpanInvalidNumRepeaters NOTIFY-TYPE
OBJECTS
{
  hdsl2ShdslSpanConfNumRepeaters
}

STATUS  current
DESCRIPTION
  "This notification indicates that a mismatch has been detected
   between the number of repeater/regenerator units configured
   for an HDSL2/SHDSL line via the hdsl2ShdslSpanConfNumRepeaters
   object and the actual number of repeater/regenerator units
   discovered via the EOC."
  ::= { hdsl2ShdslNotifications 8 }

hdsl2ShdslLoopbackFailure NOTIFY-TYPE
OBJECTS
{
  hdsl2ShdslMaintLoopbackConfig
}

STATUS  current
DESCRIPTION
  "This notification indicates that an endpoint maintenance
   loopback command failed for an HDSL2/SHDSL segment."
::= { hdsl2ShdslNotifications 9 }

hdsl2ShdslpowerBackoff NOTIFICATION-TYPE
OBJECTS
{ hdsl2ShdslEndpointCurrStatus }
STATUS current
DESCRIPTION
"This notification indicates that the bit setting for powerBackoff in the hdsl2ShdslEndpointCurrStatus object for this endpoint has changed."
::= { hdsl2ShdslNotifications 10 }

hdsl2ShdsldeviceFault NOTIFICATION-TYPE
OBJECTS
{ hdsl2ShdslEndpointCurrStatus }
STATUS current
DESCRIPTION
"This notification indicates that the bit setting for deviceFault in the hdsl2ShdslEndpointCurrStatus object for this endpoint has changed."
::= { hdsl2ShdslNotifications 11 }

hdsl2ShdsldcContinuityFault NOTIFICATION-TYPE
OBJECTS
{ hdsl2ShdslEndpointCurrStatus }
STATUS current
DESCRIPTION
"This notification indicates that the bit setting for dcContinuityFault in the hdsl2ShdslEndpointCurrStatus object for this endpoint has changed."
::= { hdsl2ShdslNotifications 12 }

hdsl2ShdslconfigInitFailure NOTIFICATION-TYPE
OBJECTS
{ hdsl2ShdslEndpointCurrStatus }
STATUS current
DESCRIPTION
"This notification indicates that the bit setting for configInitFailure in the hdsl2ShdslEndpointCurrStatus object for this endpoint has changed."
::= { hdsl2ShdslNotifications 13 }

hdsl2ShdslprotocolInitFailure NOTIFICATION-TYPE
  OBJECTS
  { hdsl2ShdslEndpointCurrStatus }
  STATUS  current
  DESCRIPTION
    "This notification indicates that the bit setting for
    protocolInitFailure in the hdsl2ShdslEndpointCurrStatus
    object for this endpoint has changed."
  ::= { hdsl2ShdslNotifications 14 }

hdsl2ShdslnoNeighborPresent NOTIFICATION-TYPE
  OBJECTS
  { hdsl2ShdslEndpointCurrStatus }
  STATUS  current
  DESCRIPTION
    "This notification indicates that the bit setting for
    noNeighborPresent in the hdsl2ShdslEndpointCurrStatus object
    for this endpoint has changed."
  ::= { hdsl2ShdslNotifications 15 }

hdsl2ShdslLocalPowerLoss NOTIFICATION-TYPE
  OBJECTS
  { hdsl2ShdslInvVendorID }
  STATUS  current
  DESCRIPTION
    "This notification indicates impending unit failure due to
    loss of local power (last gasp)."
  ::= { hdsl2ShdslNotifications 16 }

-- conformance information
--

hdsl2ShdslConformance OBJECT IDENTIFIER ::= { hdsl2ShdslMIB 3 }
hdsl2ShdslGroups     OBJECT IDENTIFIER ::= {
  hdsl2ShdslConformance 1 }
hdsl2ShdslCompliances OBJECT IDENTIFIER ::= {
  hdsl2ShdslConformance 2 }

-- agent compliance statements
hdsl2ShdslLineMibCompliance MODULE-COMPLIANCE
STATUS deprecated
DESCRIPTION
"The compliance statement for SNMP entities that implement
HDSL2 and SHDSL. The version of SHDSL supported in this
compliance statement is g.shdsl.

**** This compliance statement is deprecated. ****"
MODULE
MANDATORY-GROUPS
{ hdsl2ShdslSpanConfGroup,
  hdsl2ShdslSpanStatusGroup,
  hdsl2ShdslInventoryGroup,
  hdsl2ShdslEndpointConfGroup,
  hdsl2ShdslEndpointCurrGroup,
  hdsl2Shdsl15MinIntervalGroup,
  hdsl2Shdsl1DayIntervalGroup,
  hdsl2ShdslMaintenanceGroup,
  hdsl2ShdslEndpointAlarmConfGroup,
  hdsl2ShdslNotificationGroup
}

GROUP  hdsl2ShdslInventoryShdslGroup
DESCRIPTION
"Support for this group is only required for implementations
supporting SHDSL lines."

GROUP  hdsl2ShdslSpanShdslStatusGroup
DESCRIPTION
"Support for this group is only required for implementations
supporting SHDSL lines."

GROUP  hdsl2ShdslSpanConfProfileGroup
DESCRIPTION
"Support for this group is only required for implementations
supporting SHDSL lines."

OBJECT  hdsl2ShdslSpanConfWireInterface
SYNTAX    INTEGER
            
            { twoWire(1),
              fourWire(2)
            }
DESCRIPTION
"An implementation only has to support the range as
applicable for the original g.shdsl specification defined
in RFC 3276."
OBJECT hdsl2ShdslStatusMaxAttainableLineRate
SYNTAX      Unsigned32(0..4112000)
DESCRIPTION
  "An implementation only has to support the range as applicable for the original g.shdsl specification defined in RFC 3276."

OBJECT hdsl2ShdslStatusActualLineRate
SYNTAX      Unsigned32(0..4112000)
DESCRIPTION
  "An implementation only has to support the range as applicable for the original g.shdsl specification defined in RFC 3276."

OBJECT hdsl2ShdslSpanConfMinLineRate
SYNTAX      Unsigned32(0..4112000)
DESCRIPTION
  "An implementation only has to support the range as applicable for the original g.shdsl specification defined in RFC 3276."

OBJECT hdsl2ShdslSpanConfMaxLineRate
SYNTAX      Unsigned32(0..4112000)
DESCRIPTION
  "An implementation only has to support the range as applicable for the original g.shdsl specification defined in RFC 3276."

::= { hdsl2ShdslCompliances 1 }

hdsl2GshdslbisLineMibCompliance MODULE-COMPLIANCE
STATUS      current
DESCRIPTION
  "The compliance statement for SNMP entities that implement HDSL2 and SHDSL. The version of SHDSL supported in this compliance statement is g.shdsl.bis."

MODULE
MANDATORY-GROUPS
{ hdsl2ShdslSpanConfGroup, hdsl2ShdslSpanStatusGroup, hdsl2ShdslInventoryGroup, hdsl2ShdslEndpointConfGroup, hdsl2ShdslEndpointCurrGroup, hdsl2Shdsl15MinIntervalGroup, hdsl2Shdsl1DayIntervalGroup, hdsl2ShdslMaintenanceGroup, hdsl2Shdsl1EndpointAlarmConfGroup, }

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hdsl2ShdslNotificationGroup
)

GROUP  hdsl2ShdslInventoryShdslGroup
  DESCRIPTION
  "Support for this group is only required for implementations
   supporting SHDSL lines."

GROUP  hdsl2ShdslSpanShdslStatusGroup
  DESCRIPTION
  "Support for this group is only required for implementations
   supporting SHDSL lines."

GROUP  hdsl2ShdslSpanConfProfileGroup
  DESCRIPTION
  "Support for this group is only required for implementations
   supporting SHDSL lines."

GROUP  hdsl2ShdslWirePairGroup
  DESCRIPTION
  "Support for this group is only required for implementations
   supporting SHDSL lines."

GROUP  hdsl2ShdslPayloadRateGroup
  DESCRIPTION
  "Support for this group is only required for implementations
   supporting SHDSL lines."

::= { hdsl2ShdslCompliances 2 }

-- units of conformance
--

hdsl2ShdslSpanConfGroup OBJECT-GROUP
  OBJECTS
  { hdsl2ShdslSpanConfNumRepeaters, hdsl2ShdslSpanConfProfile, hdsl2ShdslSpanConfAlarmProfile }
  STATUS current
  DESCRIPTION
  "This group supports objects for configuring span-related
   parameters for HDSL2/SHDSL lines."
  ::= { hdsl2ShdslGroups 1 }

hdsl2ShdslSpanStatusGroup OBJECT-GROUP
  OBJECTS
{ hdsl2ShdslStatusNumAvailRepeaters }

STATUS current

DESCRIPTION
"This group supports objects for retrieving span-related status for HDSL2/SHDSL lines."
::= { hdsl2ShdslGroups 2 }

hdsl2ShdslInventoryShdslGroup OBJECT-GROUP

OBJECTS
{ hdsl2ShdslInvTransmissionModeCapability }

STATUS current

DESCRIPTION
"This group supports objects for retrieving SHDSL-specific inventory information."
::= { hdsl2ShdslGroups 3 }

hdsl2ShdslSpanShdslStatusGroup OBJECT-GROUP

OBJECTS
{ hdsl2ShdslStatusMaxAttainableLineRate,
  hdsl2ShdslStatusActualLineRate,
  hdsl2ShdslStatusTransmissionModeCurrent
 }

STATUS current

DESCRIPTION
"This group supports objects for retrieving SHDSL-specific span-related status."
::= { hdsl2ShdslGroups 4 }

hdsl2ShdslInventoryGroup OBJECT-GROUP

OBJECTS
{ hdsl2ShdslInvVendorID,
  hdsl2ShdslInvVendorModelNumber,
  hdsl2ShdslInvVendorSerialNumber,
  hdsl2ShdslInvVendorEOCSoftwareVersion,
  hdsl2ShdslInvVendorStandardVersion,
  hdsl2ShdslInvVendorListNumber,
  hdsl2ShdslInvVendorIssueNumber,
  hdsl2ShdslInvVendorSoftwareVersion,
  hdsl2ShdslInvEquipmentCode,
  hdsl2ShdslInvVendorOther
 }

STATUS current
DESCRIPTION
"This group supports objects that provide unit inventory information about the units in HDSL2/SHDSL lines."
::= { hdsl2ShdslGroups 5 }

hdsl2ShdslEndpointConfGroup OBJECT-GROUP
OBJECTS
{
  hdsl2ShdslEndpointCurrAttn
}
STATUS current
DESCRIPTION
"This group supports objects for configuring parameters for segment endpoints in HDSL2/SHDSL lines."
::= { hdsl2ShdslGroups 6 }

hdsl2ShdslEndpointCurrGroup OBJECT-GROUP
OBJECTS
{
  hdsl2ShdslEndpointCurrAttn,
  hdsl2ShdslEndpointCurrSnrMgn,
  hdsl2ShdslEndpointCurrStatus,
  hdsl2ShdslEndpointES,
  hdsl2ShdslEndpointSES,
  hdsl2ShdslEndpointCRC anomalies,
  hdsl2ShdslEndpointLOSWS,
  hdsl2ShdslEndpointUAS,
  hdsl2ShdslEndpointCurr15MinTimeElapsed,
  hdsl2ShdslEndpointCurr15MinES,
  hdsl2ShdslEndpointCurr15MinSES,
  hdsl2ShdslEndpointCurr15MinCRC anomalies,
  hdsl2ShdslEndpointCurr15MinLOSWS,
  hdsl2ShdslEndpointCurr15MinUAS,
  hdsl2ShdslEndpointCurr1DayTimeElapsed,
  hdsl2ShdslEndpointCurr1DayES,
  hdsl2ShdslEndpointCurr1DaySES,
  hdsl2ShdslEndpointCurr1DayCRC anomalies,
  hdsl2ShdslEndpointCurr1DayLOSWS,
  hdsl2ShdslEndpointCurr1DayUAS
}
STATUS current
DESCRIPTION
"This group supports objects that provide current status and performance measurements relating to segment endpoints in HDSL2/SHDSL lines."
::= { hdsl2ShdslGroups 7 }

hdsl2Shdsl15MinIntervalGroup OBJECT-GROUP
OBJECTS
{
    hdsl2Shdsl15MinIntervalES,
    hdsl2Shdsl15MinIntervalSES,
    hdsl2Shdsl15MinIntervalCRCanomalies,
    hdsl2Shdsl15MinIntervalLOSWS,
    hdsl2Shdsl15MinIntervalUAS
}
STATUS    current
DESCRIPTION
    "This group supports objects that maintain historic
    performance measurements relating to segment endpoints in
    HDSL2/SHDSL lines in 15-minute intervals."
::= { hdsl2ShdslGroups 8 }

hdsl2Shdsl1DayIntervalGroup OBJECT-GROUP
OBJECTS
{
    hdsl2Shdsl1DayIntervalMoniSecs,
    hdsl2Shdsl1DayIntervalES,
    hdsl2Shdsl1DayIntervalSES,
    hdsl2Shdsl1DayIntervalCRCanomalies,
    hdsl2Shdsl1DayIntervalLOSWS,
    hdsl2Shdsl1DayIntervalUAS
}
STATUS    current
DESCRIPTION
    "This group supports objects that maintain historic
    performance measurements relating to segment endpoints in
    HDSL2/SHDSL lines in 1-day intervals."
::= { hdsl2ShdslGroups 9 }

hdsl2ShdslMaintenanceGroup OBJECT-GROUP
OBJECTS
{
    hdsl2ShdslMaintLoopbackConfig,
    hdsl2ShdslMaintTipRingReversal,
    hdsl2ShdslMaintPowerBackOff,
    hdsl2ShdslMaintSoftRestart,
    hdsl2ShdslMaintLoopbackTimeout,
    hdsl2ShdslMaintUnitPowerSource
}
STATUS    current
DESCRIPTION
    "This group supports objects that provide support for
    maintenance actions for HDSL2/SHDSL lines."
::= { hdsl2ShdslGroups 10 }
hdsl2ShdslEndpointAlarmConfGroup OBJECT-GROUP

OBJECTS

{ hdsl2ShdslEndpointAlarmConfProfile,
  hdsl2ShdslEndpointThreshLoopAttenuation,
  hdsl2ShdslEndpointThreshSNRMargin,
  hdsl2ShdslEndpointThreshES,
  hdsl2ShdslEndpointThreshSES,
  hdsl2ShdslEndpointThreshCRCanomalies,
  hdsl2ShdslEndpointThreshLOSWS,
  hdsl2ShdslEndpointThreshUAS,
  hdsl2ShdslEndpointAlarmConfProfileRowStatus
}

STATUS current

DESCRIPTION
"This group supports objects that allow configuration of alarm
thresholds for various performance parameters for HDSL2/SHDSL
lines."
::= { hdsl2ShdslGroups 11 }

hdsl2ShdslNotificationGroup NOTIFICATION-GROUP

NOTIFICATIONS

{ hdsl2ShdslLoopAttenCrossing,
  hdsl2ShdslSNRMarginCrossing,
  hdsl2ShdslPerfESThresh,
  hdsl2ShdslPerfSESThresh,
  hdsl2ShdslPerfCRCanomaliesThresh,
  hdsl2ShdslPerfLOSWSThresh,
  hdsl2ShdslPerfUASThresh,
  hdsl2ShdslSpanInvalidNumRepeaters,
  hdsl2ShdslLoopbackFailure,
  hdsl2ShdslpowerBackoff,
  hdsl2ShdsldeviceFault,
  hdsl2ShdsldcContinuityFault,
  hdsl2ShdslconfigInitFailure,
  hdsl2ShdslprotocolInitFailure,
  hdsl2ShdslnoNeighborPresent,
  hdsl2ShdslLocalPowerLoss
}

STATUS current

DESCRIPTION
"This group supports notifications of significant conditions
associated with HDSL2/SHDSL lines."
::= { hdsl2ShdslGroups 12 }

hdsl2ShdslSpanConfProfileGroup OBJECT-GROUP

OBJECTS
{ hdsl2ShdslSpanConfWireInterface,
  hdsl2ShdslSpanConfMinLineRate,
  hdsl2ShdslSpanConfMaxLineRate,
  hdsl2ShdslSpanConfPSD,
  hdsl2ShdslSpanConfTransmissionMode,
  hdsl2ShdslSpanConfRemoteEnabled,
  hdsl2ShdslSpanConfPowerFeeding,
  hdsl2ShdslSpanConfCurrCondTargetMarginDown,
  hdsl2ShdslSpanConfWorstCaseTargetMarginDown,
  hdsl2ShdslSpanConfCurrCondTargetMarginUp,
  hdsl2ShdslSpanConfWorstCaseTargetMarginUp,
  hdsl2ShdslSpanConfUsedTargetMargins,
  hdsl2ShdslSpanConfReferenceClock,
  hdsl2ShdslSpanConfLineProbeEnable,
  hdsl2ShdslSpanConfProfileRowStatus
} STATUS current

DESCRIPTION
"This group supports objects that constitute configuration profiles for configuring span-related parameters in SHDSL lines."
 ::= { hdsl2ShdslGroups 13 }

hdsl2ShdslWirePairGroup OBJECT-GROUP
OBJECTS
{ hdsl2ShdslEndpointCurrTipRingReversal,
  hdsl2ShdslEndpointCurrActivationState
} STATUS current

DESCRIPTION
"This group supports objects that provide the status of SHDSL-specific wire pairs."
 ::= { hdsl2ShdslGroups 14 }

hdsl2ShdslPayloadRateGroup OBJECT-GROUP
OBJECTS
{ hdsl2ShdslStatusMaxAttainablePayloadRate,
  hdsl2ShdslStatusActualPayloadRate
} STATUS current

DESCRIPTION
"This group supports objects for retrieving payload rates that exclude any framing overhead."
 ::= { hdsl2ShdslGroups 15 }
4. Implementation Analysis

A management application that supports RFC 3276 could mistakenly flag a unit that responds with a rate or wire pair that exceeds the ranges and/or enumerations specified in RFC 3276. For example, a G.shdsl.bis line with four wire pairs would report statistics for wire pairs that do not exist in RFC 3276. That is, a GET-NEXT request issues with the object identifier:

```
hdsl2ShdslEndpointCurrAtn.1.1.1.2
```

might return

```
hdsl2ShdslEndpointCurrAtn.1.1.1.3 = 0
```

with a G.shdsl.bis unit and

```
hdsl2ShdslEndpointCurrSnrMgn.1.1.1.1 = 0
```

with an HDSL2 unit as these objects are indexed by

```
INDEX { ifIndex, hdsl2ShdslInvIndex, hdsl2ShdslendpointSide, hdsl2ShdslEndpointWirePair }
```

A management application intended to manage G.shdsl.bis agents SHOULD be modified to accept this sequence.

One should note that this same unmodified management application is still capable of managing G.shdsl.bis agents albeit to the degree of G.SHDSL (non-bis) limitations. That is, it can create and monitor configurations limited to two wire pairs with an upper-rate limit of 4112000 bits/second.

5. Security Considerations

There are a number of management objects defined in this MIB module with 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. These are the tables and objects and their sensitivity/vulnerability:
- **hdsl2ShdslSpanConfTable**

  The table consists of the following objects that support SET operations:

  * `hdsl2ShdslSpanConfNumRepeaters`
  * `hdsl2ShdslSpanConfProfile`
  * `hdsl2ShdslSpanConfAlarmProfile`

  Unauthorized changes to `hdsl2ShdslSpanConfNumRepeaters` could result in an `hdsl2ShdslSpanInvalidNumRepeaters` notification. Note the discussion on `hdsl2ShdslSpanInvalidNumRepeaters` in the Notifications section above.

  Unauthorized changes to `hdsl2ShdslSpanConfProfile` could have an adverse operational effect on a span. Reference the `hdsl2ShdslSpanConfProfileTable` discussion below.

  Unauthorized changes to `hdsl2ShdslSpanConfAlarmProfile` could have a contrary effect on notifications. Reference the `hdsl2ShdslEndpointAlarmConfProfileTable` discussion below.

- **hdsl2ShdslEndpointConfTable**

  This table contains one object, `hdsl2ShdslEndpointAlarmConfProfile`, that supports SET operations. Unauthorized changes could have an undesirable notifications. Reference the `hdsl2ShdslEndpointAlarmConfProfileTable` discussion below.

- **hdsl2ShdslEndpointMaintTable**

  The table consists of the following objects that support SET operations:

  * `hdsl2ShdslMaintLoopbackConfig`
  * `hdsl2ShdslMaintPowerBackoff`
  * `hdsl2ShdslMaintSoftRestart`

  Unauthorized changes to `hdsl2ShdslMaintLoopbackConfig` could prevent end-to-end data transfer due to an activation of a loopback.

  Unauthorized changes to `hdsl2ShdslMaintPowerBackoff` could result in an increased in bundle interference.
Unauthorized changes to `hdsl2ShdslMaintSoftRestart` could result in a temporary interruption of end-to-end data transfer as the result of the triggering of a soft restart.

- `hdsl2ShdslUnitMaintTable`

  This table contains one object, `hdsl2ShdslMaintLoopbackTimeout`, that supports SET operations. An unauthorized change to this object could result in the timeout value for loopbacks being increased, decreased, or disabled.

- `hdsl2ShdslSpanConfProfileTable`

  The table consists of the following objects that support SET operations:
  
  * `hdsl2ShdslSpanConfWireInterface`
  * `hdsl2ShdslSpanConfMinLineRate`
  * `hdsl2ShdslSpanConfMaxLineRate`
  * `hdsl2ShdslSpanConfPSD`
  * `hdsl2ShdslSpanConfTransmissionMode`
  * `hdsl2ShdslSpanConfRemoteEnabled`
  * `hdsl2ShdslSpanConfPowerFeeding`
  * `hdsl2ShdslSpanConfCurrCondTargetMarginDown`
  * `hdsl2ShdslSpanConfWorstCaseTargetMarginDown`
  * `hdsl2ShdslSpanConfCurrCondTargetMarginUp`
  * `hdsl2ShdslSpanConfWorstCaseTargetMarginUp`
  * `hdsl2ShdslSpanConfUsedTargetMargins`
  * `hdsl2ShdslSpanConfReferenceClock`
  * `hdsl2ShdslSpanConfLineProbeEnable`
  * `hdsl2ShdslSpanConfProfileRowStatus`

  Setting any of the objects to an incorrect value could have an adverse operational effect on a span.

  Unauthorized changes to the `hdsl2ShdslSpanConfWireInterface` could result in the failure of a span to achieve activation to a state that would permit data flow. For example, setting this object to six-wire or eight-wire operation when one of the units in the span only supports two-wire or four-wire operation would likely prevent an expected end-to-end data transfer capability.

  Unauthorized changes to `hdsl2ShdslSpanConfMinLineRate` or `hdsl2ShdslSpanConfMaxLineRate` could have an adverse effect on performance. The range of allowable line rates could be altered such that the span may not be able to train to a line rate that
would permit any end-user data to traverse the span or the span
could train to a line rate that is either greater than or less
than the line rate that the provider has pledged.

Unauthorized changes to hds12ShdslSpanConfPSD or
hds12ShdslSpanConfTransmissionMode could have a detrimental effect
on loop reach, performance, or spectral compatibility.

Unauthorized changes to hds12ShdslSpanConfRemoteEnable could alter
the remote management ability of units.

Unauthorized changes to hds12ShdslSpanConfPowerFeeding could
shutdown units that are expected to be fed power remotely.
Changing the configuration such that wetting current is not
supplied may result in corrosion of electrical contacts.

Unauthorized changes to hds12ShdslSpanConfCurrCondTargetMarginDown,
hds12ShdslSpanConfWorstCaseTargetMarginDown,
hds12ShdslSpanConfCurrCondTargetMarginUp,
hds12ShdslSpanConfWorstCaseTargetMarginUp, or
hds12ShdslSpanConfUsedTargetMargins could result in invalid
parameters used to determine if a data rate can be supported under
current and worst-case noise.

Unauthorized changes to hds12ShdslSpanConfReferenceClock could
result in the selection of a clock source that might either
prevent any data from being transferred or impair data transfer.
In addition, an increase in CRC anomalies may be experienced.

Unauthorized changes to hds12ShdslSpanConfLineProbeEnable could
have a negative effect on selecting the optimum rate or power
level based on current line conditions.

Unauthorized changes to row status could result in unwanted
profiles being created or brought into service. Also, changes to
the row status could result in profiles being inadvertently
deleted or taken out of service.

o hds12ShdslEndpointAlarmConfProfileTable

The table consists of the following objects that support SET
operations:

* hds12ShdslEndpointThreshLoopAttenuation
* hds12ShdslEndpointThreshSNRMargin
* hds12ShdslEndpointThreshES
* hds12ShdslEndpointThreshSES
Increasing any of the threshold values could result in a notification being suppressed or deferred. Setting a threshold to 0 could result in a notification being suppressed. Suppressing or deferring a notification could prevent the timely delivery of important diagnostic information. Decreasing any of the threshold values could result in a notification being sent from the network falsely reporting a threshold crossing.

Changing a threshold value could also have an impact on the amount of notifications the agent sends. This document adds a paragraph, which was not in RFC 3276 [RFC3276], to the Notifications section that provides general guidance to the rate limiting of notifications. Agent implementations not adhering to the rate-limiting desires could result in notifications being generated at an uncontrolled rate. Unauthorized changes to a threshold value could result in an undesired notification rate.

Unauthorized changes to row status could result in unwanted profiles being created or brought into service. Also, changes to the row status could result in profiles being inadvertently deleted or taken out of service.

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:

- **hdsl2ShdslInventoryTable**
  
  Access to these objects would allow an intruder to obtain information about which vendor’s equipment is in use on the network. Further, such information is considered sensitive in many environments for competitive reasons.

- **hdsl2ShdslInvVendorID**
- **hdsl2ShdslInvVendorModelNumber**
- **hdsl2ShdslInvVendorSerialNumber**
- **hdsl2ShdslInvVendorEOCSoftwareVersion**
- **hdsl2ShdslInvStandardVersion**
- **hdsl2ShdslInvVendorListNumber**
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 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.

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7. References

7.1. Normative References


7.2. Informative References

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