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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.

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1. The Internet-Standard Management Framework

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

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

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
    ...
    SYNTAX INTEGER {
        ...
        hdsl2 (168), -- High Bit-Rate DSL, 2nd generation
        shdsl (169), -- Multirate HDSL2
        ...
    }
```

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	hdl2(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].
- J. 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.

- o 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

- o 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:

- o Span Configuration Group:

This group supports MIB objects for configuring parameters for the HDSL2/SHDSL span. It contains the following table:

- hdsl2ShdslSpanConfTable

- o Span Status Group:

This group supports MIB objects for retrieving span status information. It contains the following table:

- hdsl2ShdslSpanStatusTable

- o 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

- o Segment Endpoint Configuration Group:

This group supports MIB objects for configuring parameters for the HDSL2/SHDSL segment endpoints. It contains the following table:

- hdsl2ShdslEndpointConfTable

- o 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

- o 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:

- hds12Shds11DayIntervalTable

- 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):

- hds12Shds1EndpointMaintTable
- hds12Shds1UnitMaintTable

- o Span Configuration Profile Group:

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

- hds12Shds1SpanConfProfileTable

- 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:

- hds12Shds1EndpointAlarmConfProfileTable

- o Notifications Group:

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

- hds12Shds1LoopAttenCrossing
- hds12Shds1SNRMarginCrossing
- hds12Shds1PerfESThresh
- hds12Shds1PerfSESThresh
- hds12Shds1PerfCRCAnomaliesThresh
- hds12Shds1PerfLOSSThresh
- hds12Shds1PerfUASThresh
- hds12Shds1SpanInvalidNumRepeaters
- hds12Shds1LoopbackFailure
- hds12Shds1powerBackoff
- hds12Shds1deviceFault

- hds12ShdsldcContinuityFault
- hds12Shds1configInitFailure
- hds12Shds1protocolInitFailure
- hds12Shds1noNeighborPresent
- hds12Shds1LocalPowerLoss

o SHDSL Wire Pair Group:

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

- hds12Shds1EndpointCurrTipRingReversal
- hds12Shds1EndpointCurrActivationState

o Payload Group:

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

- hds12Shds1StatusMaxAttainablePayloadRate
- hds12Shds1StatusActualPayloadRate

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.

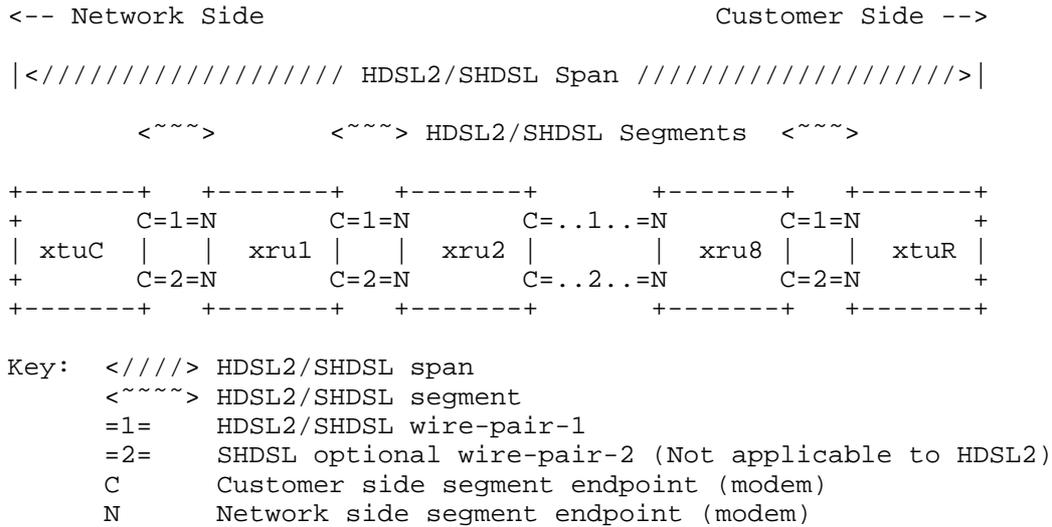


Figure 2: General Topology for an HDSL2/SHDSL Line

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 hds12Shds115MinIntervalTable is indexed by { ifIndex, hds12Shds1InvIndex, hds12Shds1EndpointSide, hds12Shds1EndpointWirePair, hds12Shds115MinIntervalNumber}. If interval 12 is determined to be invalid but intervals 11 and 13 are valid, a Get Next operation on the indices .1.1.1.1.11 would return indices .1.1.1.1.13.

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:

- o 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.

- o 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

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 CONTACT-INFO "WG-email: adslmib@ietf.org
 WG-URL:
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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).

Copyright (C) The Internet Society (2005). This version of this MIB module is part of RFC 4319; see the RFC itself for full legal notices."

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 Hdsl2Shdsl1DayIntevalCount, 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

```

{
xtuC(1),
xtuR(2),
xru1(3),
xru2(4),
xru3(5),
xru4(6),
xru5(7),
xru6(8),
xru7(9),
xru8(10)
}

```

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
--
```

```
hdl2ShdslSpanConfTable 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 }
```

```
hdl2ShdslSpanConfEntry OBJECT-TYPE
  SYNTAX       Hdsl2ShdslSpanConfEntry
  MAX-ACCESS   not-accessible
  STATUS       current
  DESCRIPTION
    "An entry in the hdl2ShdslSpanConfTable.  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 }
  ::= { hdl2ShdslSpanConfTable 1 }
```

Hdsl2ShdslSpanConfEntry ::=

```
SEQUENCE
{
  hdsl2ShdslSpanConfNumRepeaters      Unsigned32,
  hdsl2ShdslSpanConfProfile           SnmpAdminString,
  hdsl2ShdslSpanConfAlarmProfile     SnmpAdminString
}
```

hdlsl2ShdslSpanConfNumRepeaters 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 }

hdlsl2ShdslSpanConfProfile 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 }

hdlsl2ShdslSpanConfAlarmProfile 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 hds12ShdslEndpointConfTable. 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, hds12ShdslEndpointAlarmConfProfileTable, MUST be rejected."
 ::= { hds12ShdslSpanConfEntry 3 }

-- Span Status Group
 --

hds12ShdslSpanStatusTable OBJECT-TYPE
 SYNTAX SEQUENCE OF Hds12ShdslSpanStatusEntry
 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."
 ::= { hds12ShdslMibObjects 2 }

hds12ShdslSpanStatusEntry OBJECT-TYPE
 SYNTAX Hds12ShdslSpanStatusEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "An entry in the hds12ShdslSpanStatusTable. 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 }
 ::= { hds12ShdslSpanStatusTable 1 }

Hds12ShdslSpanStatusEntry ::= SEQUENCE
 {
 hds12ShdslStatusNumAvailRepeaters Unsigned32,
 hds12ShdslStatusMaxAttainableLineRate Unsigned32,
 hds12ShdslStatusActualLineRate Unsigned32,
 hds12ShdslStatusTransmissionModeCurrent
 Hds12ShdslTransmissionModeType,
 hds12ShdslStatusMaxAttainablePayloadRate Unsigned32,
 hds12ShdslStatusActualPayloadRate 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 }

hdlsl2ShdslStatusActualPayloadRate 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

--

hdlsl2ShdslInventoryTable 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 }

hdlsl2ShdslInventoryEntry 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 Hdsl2ShdslUnitId of the associated unit."

```
INDEX { ifIndex, hdsl2ShdslInvIndex }
 ::= { hdsl2ShdslInventoryTable 1 }
```

```
Hdsl2ShdslInventoryEntry ::=
```

```
SEQUENCE
 {
  hdsl2ShdslInvIndex                Hdsl2ShdslUnitId,
  hdsl2ShdslInvVendorID             OCTET STRING,
  hdsl2ShdslInvVendorModelNumber   OCTET STRING,
  hdsl2ShdslInvVendorSerialNumber  OCTET STRING,
  hdsl2ShdslInvVendorEOCSoftwareVersion Integer32,
  hdsl2ShdslInvStandardVersion     Integer32,
  hdsl2ShdslInvVendorListNumber    OCTET STRING,
  hdsl2ShdslInvVendorIssueNumber   OCTET STRING,
  hdsl2ShdslInvVendorSoftwareVersion OCTET STRING,
  hdsl2ShdslInvEquipmentCode       OCTET STRING,
  hdsl2ShdslInvVendorOther         OCTET STRING,
  hdsl2ShdslInvTransmissionModeCapability
                                     Hdsl2ShdslTransmissionModeType
 }

```

```
hdsl2ShdslInvIndex OBJECT-TYPE
```

```
SYNTAX      Hdsl2ShdslUnitId
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."

```
 ::= { hdsl2ShdslInventoryEntry 1 }
```

```
hdsl2ShdslInvVendorID 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."

```
 ::= { hdsl2ShdslInventoryEntry 2 }
```

```
hdsl2ShdslInvVendorModelNumber 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."
 ::= { hds12ShdslInventoryEntry 3 }

hds12ShdslInvVendorSerialNumber 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."
 ::= { hds12ShdslInventoryEntry 4 }

hds12ShdslInvVendorEOCSoftwareVersion 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."
 ::= { hds12ShdslInventoryEntry 5 }

hds12ShdslInvStandardVersion 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."
 ::= { hds12ShdslInventoryEntry 6 }

hds12ShdslInvVendorListNumber 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 }
```

```
hdlsl2ShdslInvVendorIssueNumber 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 }
```

```
hdlsl2ShdslInvVendorSoftwareVersion 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 }
```

```
hdlsl2ShdslInvEquipmentCode 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 }
```

```
hdlsl2ShdslInvVendorOther 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."
 ::= { hdsl2ShdslInventoryEntry 11 }

```

```

hdlsl2ShdslInvTransmissionModeCapability OBJECT-TYPE
SYNTAX Hdsl2ShdslTransmissionModeType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
  "Contains the transmission mode capability of the SHDSL unit."
 ::= { hdsl2ShdslInventoryEntry 12 }

```

```

-- Segment Endpoint Configuration Group
--

```

```

hdlsl2ShdslEndpointConfTable 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."
 ::= { hdsl2ShdslMibObjects 4 }

```

```

hdlsl2ShdslEndpointConfEntry OBJECT-TYPE
SYNTAX Hdsl2ShdslEndpointConfEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
  "An entry in the hdsl2ShdslEndpointConfTable. 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, hdsl2ShdslInvIndex, hdsl2ShdslEndpointSide,
        hdsl2ShdslEndpointWirePair }
 ::= { hdsl2ShdslEndpointConfTable 1 }

```

```

Hdsl2ShdslEndpointConfEntry ::=
SEQUENCE
{

```

```

hds12ShdslEndpointSide          Hds12ShdslUnitSide,
hds12ShdslEndpointWirePair     Hds12ShdslWirePair,
hds12ShdslEndpointAlarmConfProfile SnmpAdminString
}

```

hds12ShdslEndpointSide 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."

::= { hds12ShdslEndpointConfEntry 1 }

hds12ShdslEndpointWirePair 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."

::= { hds12ShdslEndpointConfEntry 2 }

hds12ShdslEndpointAlarmConfProfile 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 hds12ShdslEndpointAlarmConfProfileTable, 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
hds12ShdslSpanConfAlarmProfile object in the
hds12ShdslSpanConfTable. 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,
hds12ShdslEndpointAlarmConfProfileTable, MUST be rejected."

::= { hds12ShdslEndpointConfEntry 3 }

-- Segment Endpoint Current Status/Performance Group

--


```

                                Hdsl2ShdslPerfCurrDayCount,
hdsl2ShdslEndpointCurr1DayCRCAnomalies
                                Hdsl2ShdslPerfCurrDayCount,
hdsl2ShdslEndpointCurr1DayLOSWS
                                Hdsl2ShdslPerfCurrDayCount,
hdsl2ShdslEndpointCurr1DayUAS
                                Hdsl2ShdslPerfCurrDayCount,
hdsl2ShdslEndpointCurrTipRingReversal    INTEGER,
hdsl2ShdslEndpointCurrActivationState    INTEGER
}

```

hdsl2ShdslEndpointCurrAtn 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"
 ::= { hdsl2ShdslEndpointCurrEntry 1 }

```

hdsl2ShdslEndpointCurrSnrMgn 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"
 ::= { hdsl2ShdslEndpointCurrEntry 2 }

```

hdsl2ShdslEndpointCurrStatus 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 }
```

hdlsl2ShdslEndpointES 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 }
```

hdlsl2ShdslEndpointSES 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 }
```

hdlsl2ShdslEndpointCRCAnomalies 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 }
```

hdlsl2ShdslEndpointLOSWS OBJECT-TYPE

```
SYNTAX      Counter32
UNITS       "seconds"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Count of Loss of Sync Word (LOSWS) 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 }
```

hdlsl2ShdslEndpointUAS 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 }

```

```

hdlsl2ShdslEndpointCurr15MinTimeElapsed OBJECT-TYPE
SYNTAX        Hdsl2ShdslPerfTimeElapsed
UNITS         "seconds"
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION   "Total elapsed seconds in the current 15-minute interval."
 ::= { hdsl2ShdslEndpointCurrEntry 9 }

```

```

hdlsl2ShdslEndpointCurr15MinES 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 }

```

```

hdlsl2ShdslEndpointCurr15MinSES 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 }

```

```

hdlsl2ShdslEndpointCurr15MinCRCAnomalies 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 }
```

```
hdlsl2ShdslEndpointCurr15MinLOSWS 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 }
```

```
hdlsl2ShdslEndpointCurr15MinUAS 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 }
```

```
hdlsl2ShdslEndpointCurr1DayTimeElapsed 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 }
```

```
hdlsl2ShdslEndpointCurr1DayES 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 }
```

```
hdlsl2ShdslEndpointCurr1DaySES 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 hds12ShdslEndpointCurr1DayTimeElapsed."
REFERENCE     "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hds12ShdslEndpointCurrEntry 17 }

```

hds12ShdslEndpointCurr1DayCRCAnomalies 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 hds12ShdslEndpointCurr1DayTimeElapsed."
REFERENCE     "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hds12ShdslEndpointCurrEntry 18 }

```

hds12ShdslEndpointCurr1DayLOSWS OBJECT-TYPE

```

SYNTAX        Hds12ShdslPerfCurrDayCount
UNITS         "seconds"
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION   "Count of Loss of Sync Word (LOS) Seconds during the current
              day as measured by hds12ShdslEndpointCurr1DayTimeElapsed."
REFERENCE     "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hds12ShdslEndpointCurrEntry 19 }

```

hds12ShdslEndpointCurr1DayUAS 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 hds12ShdslEndpointCurr1DayTimeElapsed."
REFERENCE     "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hds12ShdslEndpointCurrEntry 20 }

```

hds12ShdslEndpointCurrTipRingReversal OBJECT-TYPE

```

SYNTAX        INTEGER
              {
                normal(1),
                reversed(2)
              }
MAX-ACCESS    read-only

```

```

STATUS      current
DESCRIPTION
  "This object indicates the state of the tip/ring for the
  wire pair."
 ::= { hdsl2ShdslEndpointCurrEntry 21 }

```

```

hdlsl2ShdslEndpointCurrActivationState 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
--

```

```

hdlsl2Shdsl15MinIntervalTable 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 }

```

```

hdlsl2Shdsl15MinIntervalEntry OBJECT-TYPE

```

```

SYNTAX      Hdsl2Shdsl15MinIntervalEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
  "An entry in the hdsl2Shdsl15MinIntervalTable."
INDEX { ifIndex, hdsl2ShdslInvIndex, hdsl2ShdslEndpointSide,
        hdsl2ShdslEndpointWirePair, hdsl2Shdsl15MinIntervalNumber }
 ::= { hdsl2Shdsl15MinIntervalTable 1 }

```

```

Hdsl2Shdsl15MinIntervalEntry ::=

```

```

SEQUENCE
{
  hdsl2Shdsl15MinIntervalNumber      Unsigned32,

```

```

hds12Shdsl15MinIntervalES          PerfIntervalCount,
hds12Shdsl15MinIntervalSES        PerfIntervalCount,
hds12Shdsl15MinIntervalCRCAnomalies PerfIntervalCount,
hds12Shdsl15MinIntervalLOSWS      PerfIntervalCount,
hds12Shdsl15MinIntervalUAS        PerfIntervalCount
}

```

hds12Shdsl15MinIntervalNumber OBJECT-TYPE

```

SYNTAX      Unsigned32(1..96)
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "Performance Data Interval number.  Interval 1 is the most
     recent previous interval; interval 96 is 24 hours ago.
     Intervals 2..96 are optional."
 ::= { hds12Shdsl15MinIntervalEntry 1 }

```

hds12Shdsl15MinIntervaleS 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"
 ::= { hds12Shdsl15MinIntervalEntry 2 }

```

hds12Shdsl15MinIntervaleSES 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"
 ::= { hds12Shdsl15MinIntervalEntry 3 }

```

hds12Shdsl15MinIntervalCRCAnomalies 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"
 ::= { hds12Shdsl15MinIntervalEntry 4 }

```

hds12Shdsl15MinIntervalLOSWS 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 }

```

```

hdlsl2Shdsl15MinIntervalUAS 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
```

```
--
```

```

hdlsl2Shdsl1DayIntervalTable 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 }

```

```

hdlsl2Shdsl1DayIntervalEntry OBJECT-TYPE

```

```

SYNTAX      Hdsl2Shdsl1DayIntervalEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "An entry in the hdsl2Shdsl1DayIntervalTable."
INDEX { ifIndex, hdsl2ShdslInvIndex, hdsl2ShdslEndpointSide,
        hdsl2ShdslEndpointWirePair, hdsl2Shdsl1DayIntervalNumber }
 ::= { hdsl2Shdsl1DayIntervalTable 1 }

```

```
Hdsl2Shdsl1DayIntervalEntry ::=
```

```

SEQUENCE
{
    hdsl2Shdsl1DayIntervalNumber      Unsigned32,
    hdsl2Shdsl1DayIntervalMoniSecs    Hdsl2ShdslPerfTimeElapsed,

```

```

hds12Shds11DayIntervaleS          Hds12Shds11DayIntervalCount,
hds12Shds11DayIntervaleSES       Hds12Shds11DayIntervalCount,
hds12Shds11DayIntervalCRCAnomalies Hds12Shds11DayIntervalCount,
hds12Shds11DayIntervalLOSWS     Hds12Shds11DayIntervalCount,
hds12Shds11DayIntervalUAS       Hds12Shds11DayIntervalCount
}

```

hds12Shds11DayIntervalNumber OBJECT-TYPE

```

SYNTAX      Unsigned32(1..30)
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "History Data Interval number.  Interval 1 is the most
    recent previous day; interval 30 is 30 days ago.  Intervals
    2..30 are optional."
 ::= { hds12Shds11DayIntervalEntry 1 }

```

hds12Shds11DayIntervalMoniSecs OBJECT-TYPE

```

SYNTAX      Hds12Shds1PerfTimeElapsed
UNITS       "seconds"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The amount of 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."
 ::= { hds12Shds11DayIntervalEntry 2 }

```

hds12Shds11DayIntervaleS OBJECT-TYPE

```

SYNTAX      Hds12Shds11DayIntervalCount
UNITS       "seconds"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Count of Errored Seconds (ES) during the 1-day interval as
    measured by hds12Shds11DayIntervalMoniSecs."
REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hds12Shds11DayIntervalEntry 3 }

```

hds12Shds11DayIntervaleSES OBJECT-TYPE

```

SYNTAX      Hds12Shds11DayIntervalCount
UNITS       "seconds"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Count of Severely Errored Seconds (SES) during the 1-day

```

interval as measured by hds12Shds11DayIntervalMoniSecs."
 REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hds12Shds11DayIntervalEntry 4 }

hds12Shds11DayIntervalCRCAnomalies OBJECT-TYPE

SYNTAX Hds12Shds11DayIntervalCount
 UNITS "detected CRC Anomalies"
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Count of CRC anomalies during the 1-day interval as
 measured by hds12Shds11DayIntervalMoniSecs."
 REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hds12Shds11DayIntervalEntry 5 }

hds12Shds11DayIntervalLOSWS OBJECT-TYPE

SYNTAX Hds12Shds11DayIntervalCount
 UNITS "seconds"
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Count of Loss of Sync Word (LOSWS) Seconds during the 1-day
 interval as measured by hds12Shds11DayIntervalMoniSecs."
 REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hds12Shds11DayIntervalEntry 6 }

hds12Shds11DayIntervalUAS OBJECT-TYPE

SYNTAX Hds12Shds11DayIntervalCount
 UNITS "seconds"
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "Count of Unavailable Seconds (UAS) during the 1-day interval
 as measured by hds12Shds11DayIntervalMoniSecs."
 REFERENCE "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hds12Shds11DayIntervalEntry 7 }

-- Maintenance Group
 --

hds12Shds1EndpointMaintTable OBJECT-TYPE

SYNTAX SEQUENCE OF Hds12Shds1EndpointMaintEntry
 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 }

```

```

hdlsl2ShdslEndpointMaintEntry 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
    }

```

```

hdlsl2ShdslMaintLoopbackConfig 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 }

```

```

hdlsl2ShdslMaintTipRingReversal 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

```

MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
  "An entry in the hds12ShdslUnitMaintTable. 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, hds12ShdslInvIndex }
 ::= { hds12ShdslUnitMaintTable 1 }

```

```

Hds12ShdslUnitMaintEntry ::=
  SEQUENCE
  {
    hds12ShdslMaintLoopbackTimeout Integer32,
    hds12ShdslMaintUnitPowerSource INTEGER
  }

```

```

hds12ShdslMaintLoopbackTimeout 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."
  ::= { hds12ShdslUnitMaintEntry 1 }

```

```

hds12ShdslMaintUnitPowerSource 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."
  ::= { hds12ShdslUnitMaintEntry 2 }

```

```

-- Span Configuration Profile Group
--

```

```

hds12ShdslSpanConfProfileTable OBJECT-TYPE
  SYNTAX SEQUENCE OF Hds12ShdslSpanConfProfileEntry
  MAX-ACCESS not-accessible
  STATUS current

```

DESCRIPTION

"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 }
```

hdlsl2ShdslSpanConfProfileEntry 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,
  hdsl2ShdslSpanConfTransmissionMode     Hdsl2ShdslTransmissionModeType,
  hdsl2ShdslSpanConfRemoteEnabled         INTEGER,
  hdsl2ShdslSpanConfPowerFeeding          INTEGER,
  hdsl2ShdslSpanConfCurrCondTargetMarginDown Integer32,
  hdsl2ShdslSpanConfWorstCaseTargetMarginDown Integer32,
  hdsl2ShdslSpanConfCurrCondTargetMarginUp Integer32,
  hdsl2ShdslSpanConfWorstCaseTargetMarginUp Integer32,
  hdsl2ShdslSpanConfUsedTargetMargins     BITS,
  hdsl2ShdslSpanConfReferenceClock        Hdsl2ShdslClockReferenceType,
  hdsl2ShdslSpanConfLineProbeEnable       INTEGER,
  hdsl2ShdslSpanConfProfileRowStatus      RowStatus
}
```

hdlsl2ShdslSpanConfProfileName 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 }

```

hdlsl2ShdslSpanConfWireInterface 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 }

```

hdlsl2ShdslSpanConfMinLineRate 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
  (hdlsl2ShdslSpanMaxLineRate), 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 }

```

hdlsl2ShdslSpanConfMaxLineRate 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      Hdsl2ShdslTransmissionModeType
```

```
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 }

```

hdlsl2ShdslSpanConfPowerFeeding 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 }

```

hdlsl2ShdslSpanConfCurrCondTargetMarginDown 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 }

```

hdlsl2ShdslSpanConfWorstCaseTargetMarginDown 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 }

```

hdlsl2ShdslSpanConfCurrCondTargetMarginUp 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 }

```

```

hdlsl2ShdslSpanConfWorstCaseTargetMarginUp 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 }

```

```

hdlsl2ShdslSpanConfUsedTargetMargins 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 } }
 ::= { hdsl2ShdslSpanConfProfileEntry 13 }

```

```

hdlsl2ShdslSpanConfReferenceClock OBJECT-TYPE

```

```

SYNTAX      Hdsl2ShdslClockReferenceType

```

```

MAX-ACCESS  read-create

```

```

STATUS      current

```

```

DESCRIPTION

```

```

    "This object configures the clock reference for the STU-C
    in an SHDSL Line."

```

```

DEFVAL      { localClk }

```

```

 ::= { hdsl2ShdslSpanConfProfileEntry 14 }

```

```

hdlsl2ShdslSpanConfLineProbeEnable 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 }

```

```

 ::= { hdsl2ShdslSpanConfProfileEntry 15 }

```

```

hdlsl2ShdslSpanConfProfileRowStatus 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 hdsl2ShdslSpanConfProfile, the
    entry MUST remain active until all references are removed."

```

```

 ::= { hdsl2ShdslSpanConfProfileEntry 16 }

```

```

-- Segment Endpoint Alarm Configuration Profile group

```

```

--

```

```

hdlsl2ShdslEndpointAlarmConfProfileTable OBJECT-TYPE

```

```

SYNTAX      SEQUENCE OF Hdsl2ShdslEndpointAlarmConfProfileEntry

```

```

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 }
```

```
hdlsl2ShdslEndpointAlarmConfProfileEntry 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

```
{
hdlsl2ShdslEndpointAlarmConfProfileName      SnmpAdminString,
hdlsl2ShdslEndpointThreshLoopAttenuation    Integer32,
hdlsl2ShdslEndpointThreshSNRMargin         Integer32,
hdlsl2ShdslEndpointThreshES                Hdsl2ShdslPerfIntervalThreshold,
hdlsl2ShdslEndpointThreshSES                Hdsl2ShdslPerfIntervalThreshold,
hdlsl2ShdslEndpointThreshCRCAnomalies      Integer32,
hdlsl2ShdslEndpointThreshLOSWS            Hdsl2ShdslPerfIntervalThreshold,
hdlsl2ShdslEndpointThreshUAS                Hdsl2ShdslPerfIntervalThreshold,
hdlsl2ShdslEndpointAlarmConfProfileRowStatus RowStatus
}
```

```
hdlsl2ShdslEndpointAlarmConfProfileName 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 }
```

```

hds12ShdslEndpointThreshLoopAttenuation 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 hds12ShdslEndpointCurrAtn reaches
        or exceeds this threshold, an hds12ShdslLoopAttenCrossing
        MAY be generated."
    DEFVAL      { 0 }
    ::= { hds12ShdslEndpointAlarmConfProfileEntry 2 }

hds12ShdslEndpointThreshSNRMargin 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 hds12ShdslEndpointCurrSnrMgn
        reaches or drops below this threshold, a
        hds12ShdslSNRMarginCrossing MAY be generated."
    DEFVAL      { 0 }
    ::= { hds12ShdslEndpointAlarmConfProfileEntry 3 }

hds12ShdslEndpointThreshES OBJECT-TYPE
    SYNTAX      Hds12ShdslPerfIntervalThreshold
    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 hds12ShdslPerfESThresh MAY be
        generated.  At most, one notification will be sent per
        interval per endpoint."
    DEFVAL      { 0 }
    ::= { hds12ShdslEndpointAlarmConfProfileEntry 4 }

hds12ShdslEndpointThreshSES OBJECT-TYPE
    SYNTAX      Hds12ShdslPerfIntervalThreshold
    UNITS       "seconds"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION

```

"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 hds12ShdslPerfSESThresh MAY be generated. At most, one notification will be sent per interval per endpoint."

```
DEFVAL      { 0 }
 ::= { hds12ShdslEndpointAlarmConfProfileEntry 5 }
```

hds12ShdslEndpointThreshCRCAnomalies 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 hds12ShdslPerfCRCAnomaliesThresh MAY be generated. At most, one notification will be sent per interval per endpoint."

```
DEFVAL      { 0 }
 ::= { hds12ShdslEndpointAlarmConfProfileEntry 6 }
```

hds12ShdslEndpointThreshLOSWS OBJECT-TYPE

```
SYNTAX      Hds12ShdslPerfIntervalThreshold
UNITS       "seconds"
MAX-ACCESS  read-create
STATUS      current
```

DESCRIPTION

"This object configures the threshold for the number of Loss of Sync Word (LOSWS) Seconds within any given 15-minute performance data collection interval. If the value of LOSWS in a particular 15-minute collection interval reaches/exceeds this value, an hds12ShdslPerfLOSWSThresh MAY be generated. At most, one notification will be sent per interval per endpoint."

```
DEFVAL      { 0 }
 ::= { hds12ShdslEndpointAlarmConfProfileEntry 7 }
```

hds12ShdslEndpointThreshUAS OBJECT-TYPE

```
SYNTAX      Hds12ShdslPerfIntervalThreshold
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 hds12ShdslPerfUASThresh MAY be generated. At most, one notification will be sent per interval per endpoint."

```
DEFVAL          { 0 }
 ::= { hds12ShdslEndpointAlarmConfProfileEntry 8 }
```

hds12ShdslEndpointAlarmConfProfileRowStatus 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 hds12ShdslSpanConfAlarmProfile or hds12ShdslEndpointAlarmConfProfile, the entry MUST remain active until all references are removed."

```
::= { hds12ShdslEndpointAlarmConfProfileEntry 9 }
```

```
-- Notifications Group
```

```
--
```

hds12ShdslNotifications OBJECT IDENTIFIER ::= { hds12ShdslMIB 0 }

hds12ShdslLoopAttenCrossing NOTIFICATION-TYPE

```
OBJECTS
{
  hds12ShdslEndpointCurrAtn,
  hds12ShdslEndpointThreshLoopAttenuation
}
STATUS          current
```

```
DESCRIPTION
  "This notification indicates that the loop attenuation
  threshold (as per the hds12ShdslEndpointThreshLoopAttenuation
  value) has been reached/exceeded for the HDSL2/SHDSL segment
  endpoint."
 ::= { hds12ShdslNotifications 1 }
```

hds12ShdslSNRMarginCrossing NOTIFICATION-TYPE

```
OBJECTS
{
  hds12ShdslEndpointCurrSnrMgn,
  hds12ShdslEndpointThreshSNRMargin
}
```

```
STATUS      current
DESCRIPTION
  "This notification indicates that the SNR margin threshold (as
  per the hds12ShdslEndpointThreshSNRMargin value) has been
  reached/exceeded for the HDSL2/SHDSL segment endpoint."
 ::= { hds12ShdslNotifications 2 }
```

hds12ShdslPerfESThresh NOTIFICATION-TYPE

```
OBJECTS
{
  hds12ShdslEndpointCurr15MinES,
  hds12ShdslEndpointThreshES
}
STATUS      current
DESCRIPTION
  "This notification indicates that the errored seconds
  threshold (as per the hds12ShdslEndpointThreshES value)
  has been reached/exceeded for the HDSL2/SHDSL segment
  endpoint."
 ::= { hds12ShdslNotifications 3 }
```

hds12ShdslPerfSESThresh NOTIFICATION-TYPE

```
OBJECTS
{
  hds12ShdslEndpointCurr15MinSES,
  hds12ShdslEndpointThreshSES
}
STATUS      current
DESCRIPTION
  "This notification indicates that the severely errored seconds
  threshold (as per the hds12ShdslEndpointThreshSES value) has
  been reached/exceeded for the HDSL2/SHDSL segment endpoint."
 ::= { hds12ShdslNotifications 4 }
```

hds12ShdslPerfCRCAnomaliesThresh NOTIFICATION-TYPE

```
OBJECTS
{
  hds12ShdslEndpointCurr15MinCRCAnomalies,
  hds12ShdslEndpointThreshCRCAnomalies
}
STATUS      current
DESCRIPTION
  "This notification indicates that the CRC anomalies threshold
  (as per the hds12ShdslEndpointThreshCRCAnomalies value) has
  been reached/exceeded for the HDSL2/SHDSL segment endpoint."
 ::= { hds12ShdslNotifications 5 }
```

hds12ShdslPerfFLOSWSThresh NOTIFICATION-TYPE

OBJECTS

```
{
hds12ShdslEndpointCurr15MinLOSWS,
hds12ShdslEndpointThreshLOSWS
}
```

```
STATUS      current
```

DESCRIPTION

```
"This notification indicates that the LOSW Seconds threshold
(as per the hds12ShdslEndpointThreshLOSWS value) has been
reached/exceeded for the HDSL2/SHDSL segment endpoint."
 ::= { hds12ShdslNotifications 6 }
```

hds12ShdslPerfUASThresh NOTIFICATION-TYPE

OBJECTS

```
{
hds12ShdslEndpointCurr15MinUAS,
hds12ShdslEndpointThreshUAS
}
```

```
STATUS      current
```

DESCRIPTION

```
"This notification indicates that the unavailable seconds
threshold (as per the hds12ShdslEndpointThreshUAS value) has
been reached/exceeded for the HDSL2/SHDSL segment endpoint."
 ::= { hds12ShdslNotifications 7 }
```

hds12ShdslSpanInvalidNumRepeaters NOTIFICATION-TYPE

OBJECTS

```
{
hds12ShdslSpanConfNumRepeaters
}
```

```
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 hds12ShdslSpanConfNumRepeaters
object and the actual number of repeater/regenerator units
discovered via the EOC."
 ::= { hds12ShdslNotifications 8 }
```

hds12ShdslLoopbackFailure NOTIFICATION-TYPE

OBJECTS

```
{
hds12ShdslMaintLoopbackConfig
}
```

```
STATUS      current
```

DESCRIPTION

```
"This notification indicates that an endpoint maintenance
loopback command failed for an HDSL2/SHDSL segment."
```

```
::= { hds12Shds1Notifications 9 }
```

```
hds12Shds1powerBackoff NOTIFICATION-TYPE
```

```
OBJECTS
```

```
{
```

```
hds12Shds1EndpointCurrStatus
```

```
}
```

```
STATUS current
```

```
DESCRIPTION
```

```
"This notification indicates that the bit setting for  
powerBackoff in the hds12Shds1EndpointCurrStatus object for  
this endpoint has changed."
```

```
::= { hds12Shds1Notifications 10 }
```

```
hds12Shds1deviceFault NOTIFICATION-TYPE
```

```
OBJECTS
```

```
{
```

```
hds12Shds1EndpointCurrStatus
```

```
}
```

```
STATUS current
```

```
DESCRIPTION
```

```
"This notification indicates that the bit setting for  
deviceFault in the hds12Shds1EndpointCurrStatus object for  
this endpoint has changed."
```

```
::= { hds12Shds1Notifications 11 }
```

```
hds12Shds1dcContinuityFault NOTIFICATION-TYPE
```

```
OBJECTS
```

```
{
```

```
hds12Shds1EndpointCurrStatus
```

```
}
```

```
STATUS current
```

```
DESCRIPTION
```

```
"This notification indicates that the bit setting for  
dcContinuityFault in the hds12Shds1EndpointCurrStatus object  
for this endpoint has changed."
```

```
::= { hds12Shds1Notifications 12 }
```

```
hds12Shds1configInitFailure NOTIFICATION-TYPE
```

```
OBJECTS
```

```
{
```

```
hds12Shds1EndpointCurrStatus
```

```
}
```

```
STATUS current
```

```
DESCRIPTION
```

```
"This notification indicates that the bit setting for  
configInitFailure in the hds12Shds1EndpointCurrStatus object  
for this endpoint has changed."
```

```

 ::= { hds12Shds1Notifications 13 }

hds12Shds1protocolInitFailure NOTIFICATION-TYPE
OBJECTS
{
hds12Shds1EndpointCurrStatus
}
STATUS current
DESCRIPTION
  "This notification indicates that the bit setting for
  protocolInitFailure in the hds12Shds1EndpointCurrStatus
  object for this endpoint has changed."
 ::= { hds12Shds1Notifications 14 }

hds12Shds1noNeighborPresent NOTIFICATION-TYPE
OBJECTS
{
hds12Shds1EndpointCurrStatus
}
STATUS current
DESCRIPTION
  "This notification indicates that the bit setting for
  noNeighborPresent in the hds12Shds1EndpointCurrStatus object
  for this endpoint has changed."
 ::= { hds12Shds1Notifications 15 }

hds12Shds1LocalPowerLoss NOTIFICATION-TYPE
OBJECTS
{
hds12Shds1InvVendorID
}
STATUS current
DESCRIPTION
  "This notification indicates impending unit failure due to
  loss of local power (last gasp)."
 ::= { hds12Shds1Notifications 16 }

-- conformance information
--

hds12Shds1Conformance OBJECT IDENTIFIER ::= { hds12Shds1MIB 3 }
hds12Shds1Groups OBJECT IDENTIFIER ::=
  { hds12Shds1Conformance 1 }
hds12Shds1Compliances OBJECT IDENTIFIER ::=
  { hds12Shds1Conformance 2 }

-- agent compliance statements

```

hds12ShdslLineMibCompliance 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

```
{
hds12ShdslSpanConfGroup,
hds12ShdslSpanStatusGroup,
hds12ShdslInventoryGroup,
hds12ShdslEndpointConfGroup,
hds12ShdslEndpointCurrGroup,
hds12Shdsl15MinIntervalGroup,
hds12Shdsl1DayIntervalGroup,
hds12ShdslMaintenanceGroup,
hds12ShdslEndpointAlarmConfGroup,
hds12ShdslNotificationGroup
}
```

GROUP hds12ShdslInventoryShdslGroup

DESCRIPTION

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

GROUP hds12ShdslSpanShdslStatusGroup

DESCRIPTION

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

GROUP hds12ShdslSpanConfProfileGroup

DESCRIPTION

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

OBJECT hds12ShdslSpanConfWireInterface

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 }

hdlsl2GshdslbisLineMibCompliance 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

```
{
hdlsl2ShdslSpanConfGroup,
hdlsl2ShdslSpanStatusGroup,
hdlsl2ShdslInventoryGroup,
hdlsl2ShdslEndpointConfGroup,
hdlsl2ShdslEndpointCurrGroup,
hdlsl2Shdsl15MinIntervalGroup,
hdlsl2Shdsl1DayIntervalGroup,
hdlsl2ShdslMaintenanceGroup,
hdlsl2ShdslEndpointAlarmConfGroup,
```

```

    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
--

hdlsl2ShdslSpanConfGroup OBJECT-GROUP
OBJECTS
  {
    hdsl2ShdslSpanConfNumRepeaters,
    hdsl2ShdslSpanConfProfile,
    hdsl2ShdslSpanConfAlarmProfile
  }
STATUS      current
DESCRIPTION
  "This group supports objects for configuring span-related
  parameters for HDSL2/SHDSL lines."
 ::= { hdsl2ShdslGroups 1 }

hdlsl2ShdslSpanStatusGroup 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,
    hdsl2ShdslInvVendorEOCSsoftwareVersion,
    hdsl2ShdslInvStandardVersion,
    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 }
```

hdl2ShdslEndpointConfGroup OBJECT-GROUP

OBJECTS

```
{
hdl2ShdslEndpointCurrAtn
}
```

```
STATUS current
```

DESCRIPTION

"This group supports objects for configuring parameters for segment endpoints in HDSL2/SHDSL lines."

```
::= { hdsl2ShdslGroups 6 }
```

hdl2ShdslEndpointCurrGroup OBJECT-GROUP

OBJECTS

```
{
hdl2ShdslEndpointCurrAtn,
hdl2ShdslEndpointCurrSnrMgn,
hdl2ShdslEndpointCurrStatus,
hdl2ShdslEndpointES,
hdl2ShdslEndpointSES,
hdl2ShdslEndpointCRCAnomalies,
hdl2ShdslEndpointLOSWS,
hdl2ShdslEndpointUAS,
hdl2ShdslEndpointCurr15MinTimeElapsed,
hdl2ShdslEndpointCurr15MinES,
hdl2ShdslEndpointCurr15MinSES,
hdl2ShdslEndpointCurr15MinCRCAnomalies,
hdl2ShdslEndpointCurr15MinLOSWS,
hdl2ShdslEndpointCurr15MinUAS,
hdl2ShdslEndpointCurr1DayTimeElapsed,
hdl2ShdslEndpointCurr1DayES,
hdl2ShdslEndpointCurr1DaySES,
hdl2ShdslEndpointCurr1DayCRCAnomalies,
hdl2ShdslEndpointCurr1DayLOSWS,
hdl2ShdslEndpointCurr1DayUAS
}
```

```
STATUS current
```

DESCRIPTION

"This group supports objects that provide current status and performance measurements relating to segment endpoints in HDSL2/SHDSL lines."

```
::= { hdsl2ShdslGroups 7 }
```

hdl2Shdsl15MinIntervalGroup OBJECT-GROUP

OBJECTS

```
{
hds12Shds115MinIntervalES,
hds12Shds115MinIntervalSES,
hds12Shds115MinIntervalCRCAnomalies,
hds12Shds115MinIntervalLOSWS,
hds12Shds115MinIntervalUAS
}
```

```
STATUS      current
```

DESCRIPTION

```
"This group supports objects that maintain historic
performance measurements relating to segment endpoints in
HDSL2/SHDSL lines in 15-minute intervals."
```

```
::= { hds12Shds1Groups 8 }
```

hds12Shds11DayIntervalGroup OBJECT-GROUP

OBJECTS

```
{
hds12Shds11DayIntervalMoniSecs,
hds12Shds11DayIntervalES,
hds12Shds11DayIntervalSES,
hds12Shds11DayIntervalCRCAnomalies,
hds12Shds11DayIntervalLOSWS,
hds12Shds11DayIntervalUAS
}
```

```
STATUS      current
```

DESCRIPTION

```
"This group supports objects that maintain historic
performance measurements relating to segment endpoints in
HDSL2/SHDSL lines in 1-day intervals."
```

```
::= { hds12Shds1Groups 9 }
```

hds12Shds1MaintenanceGroup OBJECT-GROUP

OBJECTS

```
{
hds12Shds1MaintLoopbackConfig,
hds12Shds1MaintTipRingReversal,
hds12Shds1MaintPowerBackOff,
hds12Shds1MaintSoftRestart,
hds12Shds1MaintLoopbackTimeout,
hds12Shds1MaintUnitPowerSource
}
```

```
STATUS      current
```

DESCRIPTION

```
"This group supports objects that provide support for
maintenance actions for HDSL2/SHDSL lines."
```

```
::= { hds12Shds1Groups 10 }
```

```

hds12Shds1EndpointAlarmConfGroup OBJECT-GROUP
  OBJECTS
  {
    hds12Shds1EndpointAlarmConfProfile,
    hds12Shds1EndpointThreshLoopAttenuation,
    hds12Shds1EndpointThreshSNRMargin,
    hds12Shds1EndpointThreshES,
    hds12Shds1EndpointThreshSES,
    hds12Shds1EndpointThreshCRCAnomalies,
    hds12Shds1EndpointThreshLOSWS,
    hds12Shds1EndpointThreshUAS,
    hds12Shds1EndpointAlarmConfProfileRowStatus
  }
  STATUS      current
  DESCRIPTION
    "This group supports objects that allow configuration of alarm
    thresholds for various performance parameters for HDSL2/SHDSL
    lines."
  ::= { hds12Shds1Groups 11 }

```

```

hds12Shds1NotificationGroup NOTIFICATION-GROUP
  NOTIFICATIONS
  {
    hds12Shds1LoopAttenCrossing,
    hds12Shds1SNRMarginCrossing,
    hds12Shds1PerfESThresh,
    hds12Shds1PerfSESThresh,
    hds12Shds1PerfCRCAnomaliesThresh,
    hds12Shds1PerfLOSWSThresh,
    hds12Shds1PerfUASThresh,
    hds12Shds1SpanInvalidNumRepeaters,
    hds12Shds1LoopbackFailure,
    hds12Shds1powerBackoff,
    hds12Shds1deviceFault,
    hds12Shds1dcContinuityFault,
    hds12Shds1configInitFailure,
    hds12Shds1protocolInitFailure,
    hds12Shds1noNeighborPresent,
    hds12Shds1LocalPowerLoss
  }
  STATUS      current
  DESCRIPTION
    "This group supports notifications of significant conditions
    associated with HDSL2/SHDSL lines."
  ::= { hds12Shds1Groups 12 }

```

```

hds12Shds1SpanConfProfileGroup 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 }

```

END

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:

- o hds12ShdslSpanConfTable

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

- * hds12ShdslSpanConfNumRepeaters
- * hds12ShdslSpanConfProfile
- * hds12ShdslSpanConfAlarmProfile

Unauthorized changes to hds12ShdslSpanConfNumRepeaters could result in an hds12ShdslSpanInvalidNumRepeaters notification. Note the discussion on hds12ShdslSpanInvalidNumRepeaters in the Notifications section above.

Unauthorized changes to hds12ShdslSpanConfProfile could have an adverse operational effect on a span. Reference the hds12ShdslSpanConfProfileTable discussion below.

Unauthorized changes to hds12ShdslSpanConfAlarmProfile could have a contrary effect on notifications. Reference the hds12ShdslEndpointAlarmConfProfileTable discussion below.

- o hds12ShdslEndpointConfTable

This table contains one object, hds12ShdslEndpointAlarmConfProfile, that supports SET operations. Unauthorized changes could have an undesirable notifications. Reference the hds12ShdslEndpointAlarmConfProfileTable discussion below.

- o hds12ShdslEndpointMaintTable

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

- * hds12ShdslMaintLoopbackConfig
- * hds12ShdslMaintPowerBackoff
- * hds12ShdslMaintSoftRestart

Unauthorized changes to hds12ShdslMaintLoopbackConfig could prevent end-to-end data transfer due to an activation of a loopback.

Unauthorized changes to hds12ShdslMaintPowerBackoff 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.

- o `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.

- o `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 `hdsl2ShdslSpanConfPSD` or `hdsl2ShdslSpanConfTransmissionMode` could have a detrimental effect on loop reach, performance, or spectral compatibility.

Unauthorized changes to `hdsl2ShdslSpanConfRemoteEnable` could alter the remote management ability of units.

Unauthorized changes to `hdsl2ShdslSpanConfPowerFeeding` 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 `hdsl2ShdslSpanConfCurrCondTargetMarginDown`, `hdsl2ShdslSpanConfWorstCaseTargetMarginDown`, `hdsl2ShdslSpanConfCurrCondTargetMarginUp`, `hdsl2ShdslSpanConfWorstCaseTargetMarginUp`, or `hdsl2ShdslSpanConfUsedTargetMargins` could result in invalid parameters used to determine if a data rate can be supported under current and worst-case noise.

Unauthorized changes to `hdsl2ShdslSpanConfReferenceClock` 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 `hdsl2ShdslSpanConfLineProbeEnable` 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 `hdsl2ShdslEndpointAlarmConfProfileTable`

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

- * `hdsl2ShdslEndpointThreshLoopAttenuation`
- * `hdsl2ShdslEndpointThreshSNRMargin`
- * `hdsl2ShdslEndpointThreshES`
- * `hdsl2ShdslEndpointThreshSES`

- * hdsl2ShdslEndpointThreshCRCAnomalies
- * hdsl2ShdslEndpointThreshLOSWS
- * hdsl2ShdslEndpointThreshUAS
- * hdsl2ShdslEndpointAlarmConfProfileRowStatus

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:

- o 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
- * hdsl2ShdslInvVendorEOCSsoftwareVersion
- * hdsl2ShdslInvStandardVersion
- * hdsl2ShdslInvVendorListNumber

- * hdsl2ShdslInvVendorIssueNumber
- * hdsl2ShdslInvVendorSoftwareVersion
- * hdsl2ShdslInvEquipmentCode
- * hdsl2ShdslInvVendorOther
- * hdsl2ShdslInvTransmissionModeCapability

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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