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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.

Table of Contents

1. The Internet-Standard Management Framework	2
2. Overview	2
2.1. Relationship to Other MIBs	3
2.1.1. General IF-MIB Integration (RFC 2863)	3
2.1.2. Usage of ifTable	3
2.2. IANA Considerations	4
2.3. Conventions Used in the MIB Module	5
2.3.1. Naming Conventions	5
2.3.2. Textual Conventions	5
2.4. Structure	7
2.5. Line Topology	9
2.6. Counters, Interval Buckets, and Thresholds	10
2.7. Profiles	11
2.8. Notifications	12
3. Definitions	14
4. Implementation Analysis	66
5. Security Considerations	66
6. Acknowledgements	71
7. References	72
7.1. Normative References	72
7.2. Informative References	73

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

Figure 1: Use of ifTable Objects

2.2. IANA Considerations

The HDSL2-SHDSL-LINE-MIB module requires the allocation of a single object identifier for its MODULE-IDENTITY. The IANA has allocated this object identifier in the transmission subtree (48), defined in the SNMPv2-SMI MIB module.

The assignment was in fact done when RFC 3276 was published, and this revision of the RFC does not require any new action from IANA.

2.3. Conventions Used in the MIB Module

2.3.1. Naming Conventions

- A. xtuC refers to a central site terminal unit; H2TU-C for HDSL2, or STU-C for SHDSL.
- B. xtuR refers to a remote site terminal unit; H2TU-R for HDSL2, or STU-R for SHDSL.
- C. xtu refers to a terminal unit; either an xtuC or xtuR.
- D. xru refer to a regenerator unit; H2RU for HDSL2, or SRU for SHDSL.
- E. xU refers to any HDSL2/SHDSL unit; either an xtu or xru.
- F. CRC is Cyclic Redundancy Check [G.991.2].
- G. ES means Errored Second [G.991.2].
- 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:

- hds12Shdsl1DayIntervalTable

- 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):

- hds12ShdslEndpointMaintTable
- hds12ShdslUnitMaintTable

- o Span Configuration Profile Group:

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

- hds12ShdslSpanConfProfileTable

- 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:

- hds12ShdslEndpointAlarmConfProfileTable

- o Notifications Group:

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

- hds12ShdslLoopAttenCrossing
- hds12ShdslSNRMarginCrossing
- hds12ShdslPerfESThresh
- hds12ShdslPerfSESThresh
- hds12ShdslPerfCRCAnomaliesThresh
- hds12ShdslPerfLOSWSThresh
- hds12ShdslPerfUASThresh
- hds12ShdslSpanInvalidNumRepeaters
- hds12ShdslLoopbackFailure
- hds12ShdslpowerBackoff
- hds12ShdsldeviceFault

- hds12ShdsldcContinuityFault
- hds12ShdslconfigInitFailure
- hds12ShdslprotocolInitFailure
- hds12ShdslnoNeighborPresent
- hds12ShdslLocalPowerLoss

o SHDSL Wire Pair Group:

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

- hds12ShdslEndpointCurrTipRingReversal
- hds12ShdslEndpointCurrActivationState

o Payload Group:

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

- hds12ShdslStatusMaxAttainablePayloadRate
- hds12ShdslStatusActualPayloadRate

2.5. Line Topology

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

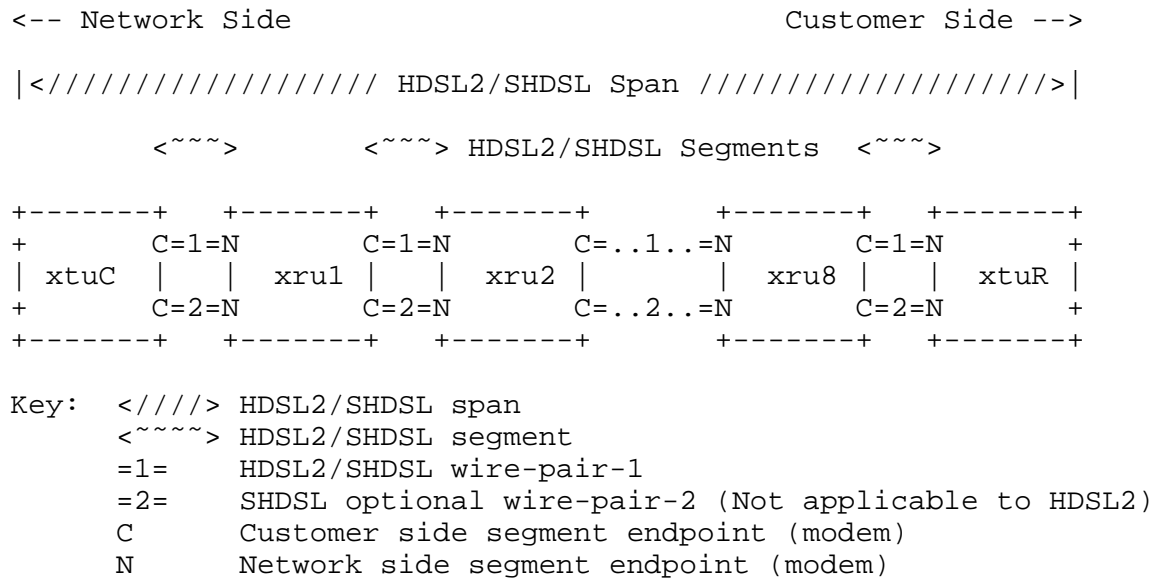


Figure 2: General Topology for an HDSL2/SHDSL Line

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 `hdl2Shdsl15MinIntervalTable` is indexed by { `ifIndex`, `hdl2ShdslInvIndex`, `hdl2ShdslEndpointSide`, `hdl2ShdslEndpointWirePair`, `hdl2Shdsl15MinIntervalNumber`}. 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 `hds12ShdslSpanConfProfileTable`. 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 `hds12ShdslEndpointAlarmConfProfileTable`.

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., `hds12ShdslEndpointAlarmConfProfile` = 'silver') by setting its `hds12ShdslEndpointAlarmConfProfile` 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, `hds12ShdslEndpointThreshSNRMargin` and `hds12ShdslEndpointThreshLoopAttenuation`, found in the `hds12ShdslEndpointAlarmConfProfileTable`. 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 `hds12ShdslSpanInvalidNumRepeaters` 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 `hds12ShdslSpanConfNumRepeaters`. 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;
```

```
hds12ShdslMIB MODULE-IDENTITY
```

```
    LAST-UPDATED "200512070000Z" -- December 7, 2005
    ORGANIZATION "ADSLMIB Working Group"
    CONTACT-INFO "WG-email:  adslmib@ietf.org
        WG-URL:
            http://www.ietf.org/html.charters/adslmib-charter.html
    Info:      https://www1.ietf.org/mailman/listinfo/adslmib
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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 }

hds12ShdslMibObjects OBJECT IDENTIFIER ::= { hds12ShdslMIB 1 }

-- Textual Conventions used in this MIB module
--

Hds12ShdslPerfCurrDayCount ::= 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 Hds12Shdsl1DayIntervalCount, 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

Hds12Shdsl1DayIntervalCount ::= 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."

::= { hdl2ShdslMibObjects 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
}

```

hds12ShdslStatusNumAvailRepeaters 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."
::= { hds12ShdslSpanStatusEntry 1 }

hds12ShdslStatusMaxAttainableLineRate 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."
::= { hds12ShdslSpanStatusEntry 2 }

hds12ShdslStatusActualLineRate 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"
::= { hds12ShdslSpanStatusEntry 3 }

hds12ShdslStatusTransmissionModeCurrent OBJECT-TYPE
SYNTAX Hds12ShdslTransmissionModeType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Contains the current Power Spectral Density (PSD) regional
setting of the HDSL2/SHDSL span."
::= { hds12ShdslSpanStatusEntry 4 }

hds12ShdslStatusMaxAttainablePayloadRate 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."
::= { hdsl2ShdslInventoryEntry 3 }

hdlsl2ShdslInvVendorSerialNumber OBJECT-TYPE
SYNTAX        OCTET STRING(SIZE(12))
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "Vendor serial number as reported in an Inventory Response
    message."
REFERENCE
    "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID
    130, Octets 45-56."
::= { hdsl2ShdslInventoryEntry 4 }

hdlsl2ShdslInvVendorEOCSoftwareVersion OBJECT-TYPE
SYNTAX        Integer32
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "Vendor EOC version as reported in a Discovery Response
    message."
REFERENCE
    "G.991.2, Section 9.5.5.7.2, Discovery response - Message ID
    129, Octet 12."
::= { hdsl2ShdslInventoryEntry 5 }

hdlsl2ShdslInvStandardVersion OBJECT-TYPE
SYNTAX        Integer32
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "Version of the HDSL2/SHDSL standard implemented, as reported
    in an Inventory Response message."
REFERENCE
    "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID
    130, Octet 2."
::= { hdsl2ShdslInventoryEntry 6 }

hdlsl2ShdslInvVendorListNumber 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

--

hds12ShdslEndpointCurrTable OBJECT-TYPE

SYNTAX SEQUENCE OF Hds12ShdslEndpointCurrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains current status and performance information for segment endpoints in HDSL2/SHDSL lines. As with other tables in this MIB module indexed by ifIndex, entries in this table MUST be maintained in a persistent manner."

::= { hds12ShdslMibObjects 5 }

hds12ShdslEndpointCurrEntry OBJECT-TYPE

SYNTAX Hds12ShdslEndpointCurrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the hds12ShdslEndpointCurrTable. Each entry contains status and performance information relating to a single segment endpoint. It is indexed by the ifIndex of the HDSL2/SHDSL line, the UnitId of the associated unit, the side of the unit, and the wire pair of the associated modem."

INDEX { ifIndex, hds12ShdslInvIndex, hds12ShdslEndpointSide, hds12ShdslEndpointWirePair }

::= { hds12ShdslEndpointCurrTable 1 }

Hds12ShdslEndpointCurrEntry ::=

SEQUENCE

{

hds12ShdslEndpointCurrAtn Integer32,

hds12ShdslEndpointCurrSnrMgn Integer32,

hds12ShdslEndpointCurrStatus BITS,

hds12ShdslEndpointES Counter32,

hds12ShdslEndpointSES Counter32,

hds12ShdslEndpointCRCAnomalies Counter32,

hds12ShdslEndpointLOSWS Counter32,

hds12ShdslEndpointUAS Counter32,

hds12ShdslEndpointCurr15MinTimeElapsed

Hds12ShdslPerfTimeElapsed,

hds12ShdslEndpointCurr15MinES PerfCurrentCount,

hds12ShdslEndpointCurr15MinSES PerfCurrentCount,

hds12ShdslEndpointCurr15MinCRCAnomalies PerfCurrentCount,

hds12ShdslEndpointCurr15MinLOSWS PerfCurrentCount,

hds12ShdslEndpointCurr15MinUAS PerfCurrentCount,

hds12ShdslEndpointCurr1DayTimeElapsed

Hds12ShdslPerfTimeElapsed,

hds12ShdslEndpointCurr1DayES

Hds12ShdslPerfCurrDayCount,

hds12ShdslEndpointCurr1DaySES

```

                                Hdsl2ShdslPerfCurrDayCount ,
hdlsl2ShdslEndpointCurr1DayCRCAnomalies
                                Hdsl2ShdslPerfCurrDayCount ,
hdlsl2ShdslEndpointCurr1DayLOSWS
                                Hdsl2ShdslPerfCurrDayCount ,
hdlsl2ShdslEndpointCurr1DayUAS
                                Hdsl2ShdslPerfCurrDayCount ,
hdlsl2ShdslEndpointCurrTipRingReversal    INTEGER,
hdlsl2ShdslEndpointCurrActivationState    INTEGER
}

hdlsl2ShdslEndpointCurrAtn 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 }

hdlsl2ShdslEndpointCurrSnrMgn 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 }

hdlsl2ShdslEndpointCurrStatus 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"

```
 ::= { hds12ShdslEndpointCurrEntry 3 }

hds12ShdslEndpointES 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"
    ::= { hds12ShdslEndpointCurrEntry 4 }

hds12ShdslEndpointSES 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"
    ::= { hds12ShdslEndpointCurrEntry 5 }

hds12ShdslEndpointCRCAnomalies 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"
    ::= { hds12ShdslEndpointCurrEntry 6 }

hds12ShdslEndpointLOSWS 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"
    ::= { hds12ShdslEndpointCurrEntry 7 }

hds12ShdslEndpointUAS OBJECT-TYPE
    SYNTAX      Counter32
```



```

    UNITS          "seconds"
    MAX-ACCESS     read-only
    STATUS         current
    DESCRIPTION
        "Count of Unavailable Seconds (UAS) on this endpoint since
         the xU was last restarted."
    REFERENCE      "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
    ::= { hdsl2ShdslEndpointCurrEntry 8 }

    hdsl2ShdslEndpointCurr15MinTimeElapsed OBJECT-TYPE
        SYNTAX      Hdsl2ShdslPerfTimeElapsed
        UNITS        "seconds"
        MAX-ACCESS   read-only
        STATUS       current
        DESCRIPTION
            "Total elapsed seconds in the current 15-minute interval."
        ::= { hdsl2ShdslEndpointCurrEntry 9 }

    hdsl2ShdslEndpointCurr15MinES OBJECT-TYPE
        SYNTAX      PerfCurrentCount
        UNITS        "seconds"
        MAX-ACCESS   read-only
        STATUS       current
        DESCRIPTION
            "Count of Errored Seconds (ES) in the current 15-minute
             interval."
        REFERENCE    "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
        ::= { hdsl2ShdslEndpointCurrEntry 10 }

    hdsl2ShdslEndpointCurr15MinSES OBJECT-TYPE
        SYNTAX      PerfCurrentCount
        UNITS        "seconds"
        MAX-ACCESS   read-only
        STATUS       current
        DESCRIPTION
            "Count of Severely Errored Seconds (SES) in the current
             15-minute interval."
        REFERENCE    "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
        ::= { hdsl2ShdslEndpointCurrEntry 11 }

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

```

```

 ::= { hdsl2ShdslEndpointCurrEntry 12 }

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

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

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

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

hdsl2ShdslEndpointCurr1DaySES OBJECT-TYPE
    SYNTAX      Hdsl2ShdslPerfCurrDayCount
    UNITS       "seconds"

```

```

MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "Count of Severely Errored Seconds (SES) during the current
    day as measured by hds12ShdslEndpointCurr1DayTimeElapsed."
REFERENCE     "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hds12ShdslEndpointCurrEntry 17 }

hds12ShdslEndpointCurr1DayCRCAnomalies OBJECT-TYPE
SYNTAX        Hdsl2ShdslPerfCurrDayCount
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        Hdsl2ShdslPerfCurrDayCount
UNITS         "seconds"
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "Count of Loss of Sync Word (LOSWS) 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        Hdsl2ShdslPerfCurrDayCount
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."
 ::= { hds12ShdslEndpointCurrEntry 21 }

hds12ShdslEndpointCurrActivationState 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"
 ::= { hds12ShdslEndpointCurrEntry 22 }

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

hds12Shdsl15MinIntervalTable OBJECT-TYPE
SYNTAX      SEQUENCE OF Hds12Shdsl15MinIntervalEntry
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."
 ::= { hds12ShdslMibObjects 6 }

hds12Shdsl15MinIntervalEntry OBJECT-TYPE
SYNTAX      Hds12Shdsl15MinIntervalEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "An entry in the hds12Shdsl15MinIntervalTable."
INDEX { ifIndex, hds12ShdslInvIndex, hds12ShdslEndpointSide,
        hds12ShdslEndpointWirePair, hds12Shdsl15MinIntervalNumber }
 ::= { hds12Shdsl15MinIntervalTable 1 }

Hds12Shdsl15MinIntervalEntry ::=
SEQUENCE
{
    hds12Shdsl15MinIntervalNumber      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 }

hds12Shdsl15MinIntervalSES 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,
hds12Shds11DayIntervalSES          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      Hds12ShdslPerfTimeElapsed
    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 }

hds12Shds11DayIntervalSES 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      Hdsl2Shds11DayIntervalCount
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      Hdsl2Shds11DayIntervalCount
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      Hdsl2Shds11DayIntervalCount
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 Hdsl2Shds1EndpointMaintEntry
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."
 ::= { hds12Shds1MibObjects 8 }

hds12Shds1EndpointMaintEntry OBJECT-TYPE
    SYNTAX      Hds12Shds1EndpointMaintEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry in the hds12Shds1EndpointMaintTable. 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, hds12Shds1InvIndex, hds12Shds1EndpointSide }
    ::= { hds12Shds1EndpointMaintTable 1 }

Hds12Shds1EndpointMaintEntry ::=
    SEQUENCE
    {
        hds12Shds1MaintLoopbackConfig      INTEGER,
        hds12Shds1MaintTipRingReversal     INTEGER,
        hds12Shds1MaintPowerBackOff        INTEGER,
        hds12Shds1MaintSoftRestart         INTEGER
    }

hds12Shds1MaintLoopbackConfig 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 hds12Shds1EndpointCurrStatus object."
    ::= { hds12Shds1EndpointMaintEntry 1 }

hds12Shds1MaintTipRingReversal 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 }

hdlsl2ShdslMaintPowerBackOff 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 }

hdlsl2ShdslMaintSoftRestart 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 }

hdlsl2ShdslUnitMaintTable 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 }

hdlsl2ShdslUnitMaintEntry OBJECT-TYPE

SYNTAX Hdsl2ShdslUnitMaintEntry

```

MAX-ACCESS    not-accessible
STATUS        current
DESCRIPTION
    "An entry in the hdsl2ShdslUnitMaintTable.  Each entry
    corresponds to a single unit and is indexed by the
    ifIndex of the HDSL2/SHDSL line and the UnitId of the
    associated unit."
INDEX { ifIndex, hdsl2ShdslInvIndex  }
 ::= { hdsl2ShdslUnitMaintTable 1 }

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

hdlsl2ShdslMaintLoopbackTimeout OBJECT-TYPE
    SYNTAX      Integer32(0..4095)
    UNITS       "minutes"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object configures the timeout value for loopbacks
        initiated at segments endpoints contained in the associated
        unit.  A value of 0 disables the timeout."
    ::= { hdsl2ShdslUnitMaintEntry 1 }

hdlsl2ShdslMaintUnitPowerSource OBJECT-TYPE
    SYNTAX      INTEGER
                {
                    local(1),
                    span(2)
                }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object indicates the DC power source being used by the
        associated unit."
    ::= { hdsl2ShdslUnitMaintEntry 2 }

-- Span Configuration Profile Group
--

hdlsl2ShdslSpanConfProfileTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Hdsl2ShdslSpanConfProfileEntry
    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."

```
::= { hds12ShdslMibObjects 10 }
```

hds12ShdslSpanConfProfileEntry OBJECT-TYPE

SYNTAX Hds12ShdslSpanConfProfileEntry

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 hds12ShdslSpanConfProfile object). Profiles may be created/deleted using the row creation/deletion mechanism via hds12ShdslSpanConfProfileRowStatus. If an active entry is referenced in hds12ShdslSpanConfProfile, the entry MUST remain active until all references are removed."

INDEX { IMPLIED hds12ShdslSpanConfProfileName }

```
::= { hds12ShdslSpanConfProfileTable 1 }
```

Hds12ShdslSpanConfProfileEntry ::=

SEQUENCE

```
{
  hds12ShdslSpanConfProfileName                SnmpAdminString,
  hds12ShdslSpanConfWireInterface              INTEGER,
  hds12ShdslSpanConfMinLineRate                Unsigned32,
  hds12ShdslSpanConfMaxLineRate               Unsigned32,
  hds12ShdslSpanConfPSD                       INTEGER,
  hds12ShdslSpanConfTransmissionMode           Hds12ShdslTransmissionModeType,
  hds12ShdslSpanConfRemoteEnabled              INTEGER,
  hds12ShdslSpanConfPowerFeeding              INTEGER,
  hds12ShdslSpanConfCurrCondTargetMarginDown  Integer32,
  hds12ShdslSpanConfWorstCaseTargetMarginDown Integer32,
  hds12ShdslSpanConfCurrCondTargetMarginUp    Integer32,
  hds12ShdslSpanConfWorstCaseTargetMarginUp   Integer32,
  hds12ShdslSpanConfUsedTargetMargins         BITS,
  hds12ShdslSpanConfReferenceClock             Hds12ShdslClockReferenceType,
  hds12ShdslSpanConfLineProbeEnable           INTEGER,
  hds12ShdslSpanConfProfileRowStatus          RowStatus
}
```

hds12ShdslSpanConfProfileName 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
    hds12ShdslSpanConfProfile in Hds12ShdslSpanConfEntry."
 ::= { hds12ShdslSpanConfProfileEntry 1 }

```

hds12ShdslSpanConfWireInterface 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 }
 ::= { hds12ShdslSpanConfProfileEntry 2 }

```

hds12ShdslSpanConfMinLineRate 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
    (hds12ShdslSpanMaxLineRate), 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 }
 ::= { hds12ShdslSpanConfProfileEntry 3 }

```

hds12ShdslSpanConfMaxLineRate 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 (hds12ShdslSpanMaxLineRate), 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 }
 ::= { hds12ShdslSpanConfProfileEntry 4 }
```

hds12ShdslSpanConfPSD 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 }
 ::= { hds12ShdslSpanConfProfileEntry 5 }
```

hds12ShdslSpanConfTransmissionMode OBJECT-TYPE

```
SYNTAX      Hds12ShdslTransmissionModeType
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

DESCRIPTION

"This object specifies the regional setting for the SHDSL line."

```
DEFVAL      { { region1 } }
 ::= { hds12ShdslSpanConfProfileEntry 6 }
```

hds12ShdslSpanConfRemoteEnabled 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 }
 ::= { hds12ShdslSpanConfProfileEntry 7 }

hds12ShdslSpanConfPowerFeeding 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 }
 ::= { hds12ShdslSpanConfProfileEntry 8 }

hds12ShdslSpanConfCurrCondTargetMarginDown 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 }
 ::= { hds12ShdslSpanConfProfileEntry 9 }

hds12ShdslSpanConfWorstCaseTargetMarginDown 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 }
 ::= { hds12ShdslSpanConfProfileEntry 10 }

hds12ShdslSpanConfCurrCondTargetMarginUp 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 } }
    ::= { hds12ShdslSpanConfProfileEntry 13 }

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

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

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

-- Segment Endpoint Alarm Configuration Profile group
--

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

```

DESCRIPTION

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

::= { hdsl2ShdslMibObjects 11 }

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

```
{
  hdsl2ShdslEndpointAlarmConfProfileName      SnmpAdminString,
  hdsl2ShdslEndpointThreshLoopAttenuation      Integer32,
  hdsl2ShdslEndpointThreshSNRMargin            Integer32,
  hdsl2ShdslEndpointThreshES                   Hdsl2ShdslPerfIntervalThreshold,
  hdsl2ShdslEndpointThreshSES                   Hdsl2ShdslPerfIntervalThreshold,
  hdsl2ShdslEndpointThreshCRCAnomalies         Integer32,
  hdsl2ShdslEndpointThreshLOSWS                Hdsl2ShdslPerfIntervalThreshold,
  hdsl2ShdslEndpointThreshUAS                   Hdsl2ShdslPerfIntervalThreshold,
  hdsl2ShdslEndpointAlarmConfProfileRowStatus 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 }

hds12ShdslPerfLOSWSThresh 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."
```

```
 ::= { hds12ShdslNotifications 9 }

hds12ShdslpowerBackoff NOTIFICATION-TYPE
OBJECTS
{
  hds12ShdslEndpointCurrStatus
}
STATUS      current
DESCRIPTION
  "This notification indicates that the bit setting for
   powerBackoff in the hds12ShdslEndpointCurrStatus object for
   this endpoint has changed."
 ::= { hds12ShdslNotifications 10 }

hds12ShdsldeviceFault NOTIFICATION-TYPE
OBJECTS
{
  hds12ShdslEndpointCurrStatus
}
STATUS      current
DESCRIPTION
  "This notification indicates that the bit setting for
   deviceFault in the hds12ShdslEndpointCurrStatus object for
   this endpoint has changed."
 ::= { hds12ShdslNotifications 11 }

hds12ShdslcdcContinuityFault NOTIFICATION-TYPE
OBJECTS
{
  hds12ShdslEndpointCurrStatus
}
STATUS      current
DESCRIPTION
  "This notification indicates that the bit setting for
   dcContinuityFault in the hds12ShdslEndpointCurrStatus object
   for this endpoint has changed."
 ::= { hds12ShdslNotifications 12 }

hds12ShdslconfigInitFailure NOTIFICATION-TYPE
OBJECTS
{
  hds12ShdslEndpointCurrStatus
}
STATUS      current
DESCRIPTION
  "This notification indicates that the bit setting for
   configInitFailure in the hds12ShdslEndpointCurrStatus object
   for this endpoint has changed."
```



```
 ::= { hds12ShdslNotifications 13 }

hds12ShdslprotocolInitFailure NOTIFICATION-TYPE
OBJECTS
{
  hds12ShdslEndpointCurrStatus
}
STATUS      current
DESCRIPTION
  "This notification indicates that the bit setting for
   protocolInitFailure in the hds12ShdslEndpointCurrStatus
   object for this endpoint has changed."
 ::= { hds12ShdslNotifications 14 }

hds12ShdslnoNeighborPresent NOTIFICATION-TYPE
OBJECTS
{
  hds12ShdslEndpointCurrStatus
}
STATUS      current
DESCRIPTION
  "This notification indicates that the bit setting for
   noNeighborPresent in the hds12ShdslEndpointCurrStatus object
   for this endpoint has changed."
 ::= { hds12ShdslNotifications 15 }

hds12ShdslLocalPowerLoss NOTIFICATION-TYPE
OBJECTS
{
  hds12ShdslInvVendorID
}
STATUS      current
DESCRIPTION
  "This notification indicates impending unit failure due to
   loss of local power (last gasp)."
 ::= { hds12ShdslNotifications 16 }

-- conformance information
--

hds12ShdslConformance OBJECT IDENTIFIER ::= { hds12ShdslMIB 3 }
hds12ShdslGroups      OBJECT IDENTIFIER ::=
    { hds12ShdslConformance 1 }
hds12ShdslCompliances OBJECT IDENTIFIER ::=
    { hds12ShdslConformance 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 hds12ShdslStatusMaxAttainableLineRate

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 hds12ShdslStatusActualLineRate

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 hds12ShdslSpanConfMinLineRate

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 hds12ShdslSpanConfMaxLineRate

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."

::= { hds12ShdslCompliances 1 }

hds12GshdslbisLineMibCompliance 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

{
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."

GROUP hds12ShdslWirePairGroup
DESCRIPTION
    "Support for this group is only required for implementations
    supporting SHDSL lines."

GROUP hds12ShdslPayloadRateGroup
DESCRIPTION
    "Support for this group is only required for implementations
    supporting SHDSL lines."

 ::= { hds12ShdslCompliances 2 }

-- units of conformance
--

hds12ShdslSpanConfGroup OBJECT-GROUP
    OBJECTS
        {
            hds12ShdslSpanConfNumRepeaters,
            hds12ShdslSpanConfProfile,
            hds12ShdslSpanConfAlarmProfile
        }
    STATUS      current
    DESCRIPTION
        "This group supports objects for configuring span-related
        parameters for HDSL2/SHDSL lines."
    ::= { hds12ShdslGroups 1 }

hds12ShdslSpanStatusGroup OBJECT-GROUP
    OBJECTS
```

```
{
hds12ShdslStatusNumAvailRepeaters
}
STATUS          current
DESCRIPTION
    "This group supports objects for retrieving span-related
    status for HDSL2/SHDSL lines."
::= { hds12ShdslGroups 2 }

hds12ShdslInventoryShdslGroup OBJECT-GROUP
OBJECTS
{
hds12ShdslInvTransmissionModeCapability
}
STATUS          current
DESCRIPTION
    "This group supports objects for retrieving SHDSL-specific
    inventory information."
::= { hds12ShdslGroups 3 }

hds12ShdslSpanShdslStatusGroup OBJECT-GROUP
OBJECTS
{
hds12ShdslStatusMaxAttainableLineRate,
hds12ShdslStatusActualLineRate,
hds12ShdslStatusTransmissionModeCurrent
}
STATUS          current
DESCRIPTION
    "This group supports objects for retrieving SHDSL-specific
    span-related status."
::= { hds12ShdslGroups 4 }

hds12ShdslInventoryGroup OBJECT-GROUP
OBJECTS
{
hds12ShdslInvVendorID,
hds12ShdslInvVendorModelNumber,
hds12ShdslInvVendorSerialNumber,
hds12ShdslInvVendorEOCSoftwareVersion,
hds12ShdslInvStandardVersion,
hds12ShdslInvVendorListNumber,
hds12ShdslInvVendorIssueNumber,
hds12ShdslInvVendorSoftwareVersion,
hds12ShdslInvEquipmentCode,
hds12ShdslInvVendorOther
}
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
{
  hds12Shds15MinIntervalES,
  hds12Shds15MinIntervalSES,
  hds12Shds15MinIntervalCRCAnomalies,
  hds12Shds15MinIntervalLOSWS,
  hds12Shds15MinIntervalUAS
}
STATUS          current
DESCRIPTION
  "This group supports objects that maintain historic
   performance measurements relating to segment endpoints in
   HDSL2/SHDSL lines in 15-minute intervals."
 ::= { hds12ShdslGroups 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."
 ::= { hds12ShdslGroups 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."
 ::= { hds12ShdslGroups 10 }

```

hds12ShdslEndpointAlarmConfGroup OBJECT-GROUP

OBJECTS

```
{
  hds12ShdslEndpointAlarmConfProfile,
  hds12ShdslEndpointThreshLoopAttenuation,
  hds12ShdslEndpointThreshSNRMargin,
  hds12ShdslEndpointThreshES,
  hds12ShdslEndpointThreshSES,
  hds12ShdslEndpointThreshCRCAnomalies,
  hds12ShdslEndpointThreshLOSWS,
  hds12ShdslEndpointThreshUAS,
  hds12ShdslEndpointAlarmConfProfileRowStatus
}
```

STATUS current

DESCRIPTION

"This group supports objects that allow configuration of alarm thresholds for various performance parameters for HDSL2/SHDSL lines."

```
::= { hds12ShdslGroups 11 }
```

hds12ShdslNotificationGroup NOTIFICATION-GROUP

NOTIFICATIONS

```
{
  hds12ShdslLoopAttenCrossing,
  hds12ShdslSNRMarginCrossing,
  hds12ShdslPerfESThresh,
  hds12ShdslPerfSESThresh,
  hds12ShdslPerfCRCAnomaliesThresh,
  hds12ShdslPerfLOSWSThresh,
  hds12ShdslPerfUASThresh,
  hds12ShdslSpanInvalidNumRepeaters,
  hds12ShdslLoopbackFailure,
  hds12ShdslpowerBackoff,
  hds12ShdsldeviceFault,
  hds12ShdslcdcContinuityFault,
  hds12ShdslconfigInitFailure,
  hds12ShdslprotocolInitFailure,
  hds12ShdslnoNeighborPresent,
  hds12ShdslLocalPowerLoss
}
```

STATUS current

DESCRIPTION

"This group supports notifications of significant conditions associated with HDSL2/SHDSL lines."

```
::= { hds12ShdslGroups 12 }
```

hds12ShdslSpanConfProfileGroup OBJECT-GROUP

OBJECTS


```

{
  hds12ShdslSpanConfWireInterface,
  hds12ShdslSpanConfMinLineRate,
  hds12ShdslSpanConfMaxLineRate,
  hds12ShdslSpanConfPSD,
  hds12ShdslSpanConfTransmissionMode,
  hds12ShdslSpanConfRemoteEnabled,
  hds12ShdslSpanConfPowerFeeding,
  hds12ShdslSpanConfCurrCondTargetMarginDown,
  hds12ShdslSpanConfWorstCaseTargetMarginDown,
  hds12ShdslSpanConfCurrCondTargetMarginUp,
  hds12ShdslSpanConfWorstCaseTargetMarginUp,
  hds12ShdslSpanConfUsedTargetMargins,
  hds12ShdslSpanConfReferenceClock,
  hds12ShdslSpanConfLineProbeEnable,
  hds12ShdslSpanConfProfileRowStatus
}
STATUS          current
DESCRIPTION
  "This group supports objects that constitute configuration
   profiles for configuring span-related parameters in SHDSL
   lines."
 ::= { hds12ShdslGroups 13 }

hds12ShdslWirePairGroup OBJECT-GROUP
OBJECTS
{
  hds12ShdslEndpointCurrTipRingReversal,
  hds12ShdslEndpointCurrActivationState
}
STATUS          current
DESCRIPTION
  "This group supports objects that provide the status
   of SHDSL-specific wire pairs."
 ::= { hds12ShdslGroups 14 }

hds12ShdslPayloadRateGroup OBJECT-GROUP
OBJECTS
{
  hds12ShdslStatusMaxAttainablePayloadRate,
  hds12ShdslStatusActualPayloadRate
}
STATUS          current
DESCRIPTION
  "This group supports objects for retrieving payload rates
   that exclude any framing overhead."
 ::= { hds12ShdslGroups 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:

```
hds12ShdslEndpointCurrAtn.1.1.1.2
```

might return

```
hds12ShdslEndpointCurrAtn.1.1.1.3 = 0
```

with a G.shdsl.bis unit and

```
hds12ShdslEndpointCurrSnrMgn.1.1.1.1 = 0
```

with an HDSL2 unit as these objects are indexed by

```
INDEX { ifIndex, hds12ShdslInvIndex, hds12ShdslendpointSide,  
         hds12ShdslEndpointWirePair }
```

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 hds12Shds1SpanConfTable

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

- * hds12Shds1SpanConfNumRepeaters
- * hds12Shds1SpanConfProfile
- * hds12Shds1SpanConfAlarmProfile

Unauthorized changes to hds12Shds1SpanConfNumRepeaters could result in an hds12Shds1SpanInvalidNumRepeaters notification. Note the discussion on hds12Shds1SpanInvalidNumRepeaters in the Notifications section above.

Unauthorized changes to hds12Shds1SpanConfProfile could have an adverse operational effect on a span. Reference the hds12Shds1SpanConfProfileTable discussion below.

Unauthorized changes to hds12Shds1SpanConfAlarmProfile could have a contrary effect on notifications. Reference the hds12Shds1EndpointAlarmConfProfileTable discussion below.

- o hds12Shds1EndpointConfTable

This table contains one object, hds12Shds1EndpointAlarmConfProfile, that supports SET operations. Unauthorized changes could have an undesirable notifications. Reference the hds12Shds1EndpointAlarmConfProfileTable discussion below.

- o hds12Shds1EndpointMaintTable

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

- * hds12Shds1MaintLoopbackConfig
- * hds12Shds1MaintPowerBackoff
- * hds12Shds1MaintSoftRestart

Unauthorized changes to hds12Shds1MaintLoopbackConfig could prevent end-to-end data transfer due to an activation of a loopback.

Unauthorized changes to hds12Shds1MaintPowerBackoff 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 `hds12ShdslSpanConfPSD` or `hds12ShdslSpanConfTransmissionMode` could have a detrimental effect on loop reach, performance, or spectral compatibility.

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

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

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

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

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

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

o `hds12ShdslEndpointAlarmConfProfileTable`

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

- * `hds12ShdslEndpointThreshLoopAttenuation`
- * `hds12ShdslEndpointThreshSNRMargin`
- * `hds12ShdslEndpointThreshES`
- * `hds12ShdslEndpointThreshSES`

- * hds12ShdslEndpointThreshCRCAnomalies
- * hds12ShdslEndpointThreshLOSWS
- * hds12ShdslEndpointThreshUAS
- * hds12ShdslEndpointAlarmConfProfileRowStatus

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 hds12ShdslInventoryTable

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.

- * hds12ShdslInvVendorID
- * hds12ShdslInvVendorModelNumber
- * hds12ShdslInvVendorSerialNumber
- * hds12ShdslInvVendorEOCSoftwareVersion
- * hds12ShdslInvStandardVersion
- * hds12ShdslInvVendorListNumber

- * hds12ShdslInvVendorIssueNumber
- * hds12ShdslInvVendorSoftwareVersion
- * hds12ShdslInvEquipmentCode
- * hds12ShdslInvVendorOther
- * hds12ShdslInvTransmissionModeCapability

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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