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**Definitions of Managed Objects for G.shdsl.bis Lines
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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](#)). The MIB module described in this document will obsolete the MIB module described in [RFC 3276](#).

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1. Introduction

This document defines a Management Information Base (MIB) module for use with network management protocols in the Internet community. 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](#)]. 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.

2. 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](#)].

3. Introduction

This document describes an SNMP MIB for managing HDSL2/SHDSL Lines. These definitions are based upon the specifications for the HDSL2 and SHDSL Embedded Operations Channel (EOC) as defined in American National Standards Institute (ANSI) T1E1.4/2000-006 [[T1E1.4](#)] and International Telecommunication Union (ITU) G.991.2 [[G.991.2](#)].

The MIB is located in the MIB tree under MIB 2 transmission, as discussed in the MIB-2 Integration ([RFC 3418](#) [[RFC3418](#)] and [RFC 2863](#) [[RFC2863](#)]) section of this document.

3.1 Relationship of the HDSL2/SHDSL Line MIB to other MIBs

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

[3.1.1](#) 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.

[3.1.2](#) 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, those table entries indexed by ifIndex MUST be persistent.

The following attributes are part of the mandatory ifGeneral group in [RFC 2863](#) [[RFC2863](#)], and are not duplicated in the HDSL2/SHDSL Line MIB.

=====	
ifIndex	Interface index.
ifDescr	See interfaces MIB [RFC2863].
ifType	hdl2(168) or shdsl(169).
ifSpeed	Set as appropriate. (This is fixed at 1552000 for HDSL2 lines)
ifPhysAddress	This object MUST have an octet string with zero length.
ifAdminStatus	See interfaces MIB [RFC2863].
ifOperStatus	See interfaces MIB [RFC2863].
ifLastChange	See interfaces MIB [RFC2863].
ifName	See interfaces MIB [RFC2863].
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

[3.2](#) 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.

[4.](#) Conventions used in the MIB

[4.1](#) 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](#)].

4.2 Textual Conventions

The following textual conventions are defined to reflect the line topology in the MIB (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 a 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 a 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.

o Hdsl2Shdsl1DayIntervalCount:

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

o Hdsl2ShdslPerfTimeElapsed:

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

o Hdsl2ShdslPerfIntervalThreshold:

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

o Hdsl2ShdslClockReferenceType:

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

4.3 Structure

The MIB is structured into 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:

- hdsl2Shdsl1DayIntervalTable

- o Maintenance Group:

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

- hdsl2ShdslEndpointMaintTable
- hdsl2ShdslUnitMaintTable

o Span Configuration Profile Group:

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

- hdsl2ShdslSpanConfProfileTable

o Segment Endpoint Alarm Configuration Profile Group:

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

- hdsl2ShdslEndpointAlarmConfProfileTable

o Notifications Group:

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

- hdsl2ShdslLoopAttenCrossing
- hdsl2ShdslSNRMarginCrossing
- hdsl2ShdslPerfESThresh
- hdsl2ShdslPerfSESThresh
- hdsl2ShdslPerfCRCAnomaliesThresh
- hdsl2ShdslPerfLOSSThresh
- hdsl2ShdslPerfUASThresh
- hdsl2ShdslSpanInvalidNumRepeaters
- hdsl2ShdslLoopbackFailure
- hdsl2ShdslPowerBackoff
- hdsl2ShdslDeviceFault
- hdsl2ShdslDCContinuityFault
- hdsl2ShdslConfigInitFailure
- hdsl2ShdslProtocolInitFailure
- hdsl2ShdslNoNeighborPresent
- hdsl2ShdslLocalPowerLoss

o SHDSL Wire Pair Group:

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

- hds12ShdslEndpointCurrTipRingReversal
- hds12ShdslEndpointCurrActivationState

o Payload Group:

This group supports MIB objects for retrieving payload rates which excludes any framing overhead.

- hds12ShdslStatusMaxAttainablePayloadRate
- hds12ShdslStatusActualPayloadRate

4.3.1 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.

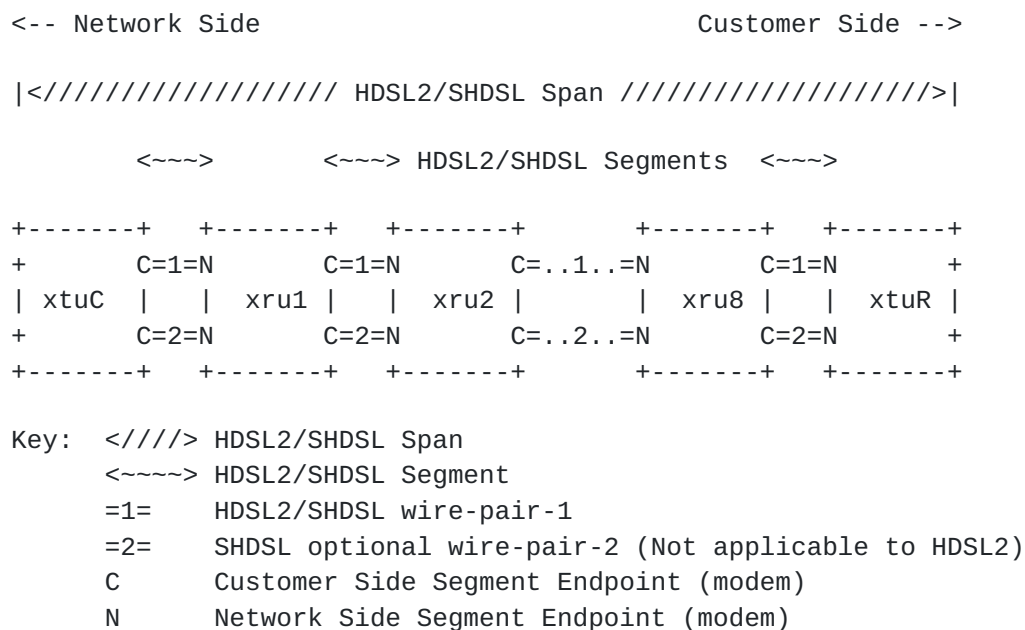


Figure 2: General topology for an HDSL2/SHDSL Line

4.4 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 for invalid buckets. In those cases where the data for an interval is suspect or known to be invalid, the agent MUST NOT report the interval. If the current 15-minute event bucket is determined to be invalid, notifications based upon the value of the event bucket MUST NOT be generated.

Not reporting an interval will result in holes in the associated table. For example, the table, `hds12Shdsl15MinIntervalTable`, is indexed by { `ifIndex`, `hds12ShdslInvIndex`, `hds12ShdslEndpointSide`, `hds12ShdslEndpointWirePair`, `hds12Shdsl15MinIntervalNumber`}. If interval 12 is determined to be invalid but intervals 11 and 13 are valid, a Get Next operation on the indices `.1.1.1.1.11` 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 fifteen minute interval and any wall clock; however some implementations may align the fifteen minute intervals with quarter hours. Likewise, an implementation may choose to align one 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).

[4.5](#) 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 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:

- 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 are 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 `hds12Shds1EndpointAlarmConfProfileTable`.

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., `hds12Shds1EndpointAlarmConfProfile = 'silver'`) by setting its `hds12Shds1EndpointAlarmConfProfile` 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 `hds12Shds1EndpointAlarmConfProfile` and `hds12Shds1SpanConfProfile` to 'DEFVAL' where appropriate. This default profile name, 'DEFVAL', is considered reserved in the context of profiles defined in this MIB.

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.

[4.6](#) 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 of 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 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 `hds12ShdslEndpointCurrStatus` is a bitmask representing all outstanding error conditions associated with a particular Segment Endpoint. Note that since 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, 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, 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. One notification may 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.

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.

A `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.

5. Conformance and Compliance

For both HDSL2 and SHDSL lines, the following group(s) are mandatory:

- hds12ShdslSpanConfGroup
- hds12ShdslSpanStatusGroup
- hds12ShdslInventoryGroup
- hds12ShdslEndpointConfGroup
- hds12Shdsl15MinIntervalGroup
- hds12Shdsl1DayIntervalGroup
- hds12ShdslMaintenanceGroup
- hds12ShdslEndpointAlarmConfGroup
- hds12ShdslNotificationGroup
- hds12ShdslWirePairGroup
- hds12ShdslPayloadRateGroup

For HDSL2 lines, the following group(s) are optional:

- hds12ShdslSpanConfProfileGroup
- hds12ShdslSpanShdslStatusGroup
- hds12ShdslWirePairGroup
- hds12ShdslPayloadRateGroup

6. 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

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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 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)."

REVISION "200408270000Z" -- August 27, 2004

DESCRIPTION "Initial version, published as RFC xxxx.

The following changes have been made from [RFC 3276](#):

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 or not the tip and ring are reversed on a wire pair.
5. Added an object to display the activation state of a wire pair.
6. Added references as necessary for clarification.
7. Added display hints to textual conventions as necessary.
8. Updated conformance statements as necessary.
9. Some changes were due to IETF requirements and RFC generation tools."

REVISION "200205090000Z" -- May 9, 2002

DESCRIPTION "Initial version, published as [RFC 3276](#)."

::= { transmission 48 }

hdsl2ShdslMibObjects OBJECT IDENTIFIER ::= { hdsl2ShdslMIB 1 }

-- Textual Conventions used in this MIB

--

Hdsl2ShdslPerfCurrDayCount ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

"A gauge associated with interface performance measurements in a current 1-day (24 hour) measurement interval.

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

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

SYNTAX Gauge32

Hdsl2Shdsl1DayIntervalCount ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

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

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

SYNTAX Gauge32

Hdsl2ShdslPerfTimeElapsed ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

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

For 15 minute intervals, the range is limited to (0..899).

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

SYNTAX Unsigned32(0..86399)

Hdsl2ShdslPerfIntervalThreshold ::= TEXTUAL-CONVENTION

DISPLAY-HINT "d"

STATUS current

DESCRIPTION

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

SYNTAX Unsigned32(0..900)

Hdsl2ShdslUnitId ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This is the unique identification for all units in a 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 a 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 a 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:

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

--

hdlsl2ShdslSpanConfTable OBJECT-TYPE

SYNTAX SEQUENCE OF Hdsl2ShdslSpanConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table supports overall configuration of HDSL2/SHDSL Spans. Entries in this table MUST be maintained in a persistent manner."

::= { hdsl2ShdslMibObjects 1 }

hdlsl2ShdslSpanConfEntry OBJECT-TYPE

SYNTAX Hdsl2ShdslSpanConfEntry

MAX-ACCESS not-accessible

STATUS current
DESCRIPTION
"An entry in the hds12ShdslSpanConfTable. 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 }
::= { hds12ShdslSpanConfTable 1 }

Hds12ShdslSpanConfEntry ::= SEQUENCE
{
hds12ShdslSpanConfNumRepeaters Unsigned32,
hds12ShdslSpanConfProfile SnmpAdminString,
hds12ShdslSpanConfAlarmProfile SnmpAdminString
}

hds12ShdslSpanConfNumRepeaters 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."
::= { hds12ShdslSpanConfEntry 1 }

hds12ShdslSpanConfProfile 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 hds12ShdslSpanConfProfileTable, which applies to this span. The value of this object is the index of the referenced profile in the hds12ShdslSpanConfProfileTable. 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, hds12ShdslSpanConfProfileTable, MUST be rejected."
::= { hds12ShdslSpanConfEntry 2 }

hds12ShdslSpanConfAlarmProfile 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 hds12ShdslEndpointAlarmConfProfileTable. The value of this object is the index of the referenced profile in the hds12ShdslEndpointAlarmConfProfileTable. 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 HDLSL2/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 HDLSL2/SHDSL line. It is indexed by the ifIndex of the associated HDLSL2/SHDSL line."

INDEX { ifIndex }

::= { hds12ShdslSpanStatusTable 1 }

Hds12ShdslSpanStatusEntry ::=

SEQUENCE


```
{
  hdsl2ShdslStatusNumAvailRepeaters      Unsigned32,
  hdsl2ShdslStatusMaxAttainableLineRate   Unsigned32,
  hdsl2ShdslStatusActualLineRate         Unsigned32,
  hdsl2ShdslStatusTransmissionModeCurrent
                                     Hdsl2ShdslTransmissionModeType,
  hdsl2ShdslStatusMaxAttainablePayloadRate Unsigned32,
  hdsl2ShdslStatusActualPayloadRate      Unsigned32
}
```

hdlsl2ShdslStatusNumAvailRepeaters OBJECT-TYPE

```
SYNTAX      Unsigned32(0..8)
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Contains the actual number of repeaters/regenerators
     discovered in this HDSL2/SHDSL span."
 ::= { hdsl2ShdslSpanStatusEntry 1 }
```

hdlsl2ShdslStatusMaxAttainableLineRate OBJECT-TYPE

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

hdlsl2ShdslStatusActualLineRate OBJECT-TYPE

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

hdlsl2ShdslStatusTransmissionModeCurrent OBJECT-TYPE

```
SYNTAX      Hdsl2ShdslTransmissionModeType
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
```


"Contains the current Power Spectral Density (PSD) regional setting of the HDSL2/SHDSL span."
::= { hdsl2ShdslSpanStatusEntry 4 }

hdlsl2ShdslStatusMaxAttainablePayloadRate 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 a 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."
 ::= { hds12ShdslMibObjects 3 }

hds12ShdslInventoryEntry OBJECT-TYPE

SYNTAX Hds12ShdslInventoryEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the hds12ShdslInventoryTable. Each entry represents inventory information for a single unit in a HDSL2/SHDSL line. It is indexed by the ifIndex of the HDSL2/SHDSL line and the Hds12ShdslUnitId of the associated unit."

INDEX { ifIndex, hds12ShdslInvIndex }

::= { hds12ShdslInventoryTable 1 }

Hds12ShdslInventoryEntry ::=

SEQUENCE

```
{
  hds12ShdslInvIndex          Hds12ShdslUnitId,
  hds12ShdslInvVendorID      OCTET STRING,
  hds12ShdslInvVendorModelNumber OCTET STRING,
  hds12ShdslInvVendorSerialNumber OCTET STRING,
  hds12ShdslInvVendorEOCSoftwareVersion Integer32,
  hds12ShdslInvStandardVersion Integer32,
  hds12ShdslInvVendorListNumber OCTET STRING,
  hds12ShdslInvVendorIssueNumber OCTET STRING,
  hds12ShdslInvVendorSoftwareVersion OCTET STRING,
  hds12ShdslInvEquipmentCode OCTET STRING,
  hds12ShdslInvVendorOther OCTET STRING,
  hds12ShdslInvTransmissionModeCapability
                                Hds12ShdslTransmissionModeType
}
```

hds12ShdslInvIndex OBJECT-TYPE

SYNTAX Hds12ShdslUnitId

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Each entry in this table corresponds to a physical element in a HDSL2/SHDSL Span. It is based on the EOC unit addressing scheme with reference to the xtuC."

::= { hds12ShdslInventoryEntry 1 }

hds12ShdslInvVendorID OBJECT-TYPE

SYNTAX OCTET STRING(SIZE(8))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Vendor ID as reported in an Inventory Response message."

REFERENCE

"G.991.2, [Section 9.5.5.7.4](#), Inventory response - Message ID 130, Octets 25-32."

::= { hds12ShdslInventoryEntry 2 }

hds12ShdslInvVendorModelNumber OBJECT-TYPE

SYNTAX OCTET STRING(SIZE(12))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Vendor model number as reported in an Inventory Response message."

REFERENCE

"G.991.2, [Section 9.5.5.7.4](#), Inventory response - Message ID 130, Octets 33-44."

::= { hds12ShdslInventoryEntry 3 }

hds12ShdslInvVendorSerialNumber OBJECT-TYPE

SYNTAX OCTET STRING(SIZE(12))

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Vendor serial number as reported in an Inventory Response message."

REFERENCE

"G.991.2, [Section 9.5.5.7.4](#), Inventory response - Message ID 130, Octets 45-56."

::= { hds12ShdslInventoryEntry 4 }

hds12ShdslInvVendorEOCSoftwareVersion OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Vendor EOC version as reported in a Discovery Response message."

REFERENCE

"G.991.2, [Section 9.5.5.7.2](#), Discovery response - Message ID 130, Octet 12."

::= { hds12ShdslInventoryEntry 5 }

hds12ShdslInvStandardVersion OBJECT-TYPE

SYNTAX Integer32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Version of the HDSL2/SHDSL standard implemented, as reported in an Inventory Response message."

REFERENCE

"G.991.2, [Section 9.5.5.7.4](#), Inventory response - Message ID 130, Octet 2."

::= { 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 a 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 a 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
{
    hdsl2ShdslEndpointSide          Hdsl2ShdslUnitSide,
    hdsl2ShdslEndpointWirePair      Hdsl2ShdslWirePair,
    hdsl2ShdslEndpointAlarmConfProfile SnmpAdminString
}
```

```
hdlsl2ShdslEndpointSide OBJECT-TYPE
SYNTAX      Hdsl2ShdslUnitSide
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The side of the unit associated with this segment endpoint -
    Network/Customer side - as per the Hdsl2ShdslUnitSide textual
    convention."
 ::= { hdsl2ShdslEndpointConfEntry 1 }
```

```
hdlsl2ShdslEndpointWirePair OBJECT-TYPE
SYNTAX      Hdsl2ShdslWirePair
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The wire pair of the modem associated with this segment
    endpoint as per the Hdsl2ShdslWirePair textual convention."
 ::= { hdsl2ShdslEndpointConfEntry 2 }
```

```
hdlsl2ShdslEndpointAlarmConfProfile OBJECT-TYPE
SYNTAX      SnmpAdminString (SIZE(0..32))
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This object configures the alarm threshold values to be used
    for this segment endpoint. The values are obtained from the
    alarm configuration profile referenced by this object. The
    value of this object is the index of the referenced profile in
    the hdsl2ShdslEndpointAlarmConfProfileTable, or NULL (a
    zero-length SnmpAdminString). If the value is a zero-length
    SnmpAdminString, the endpoint uses the default Alarm
    Configuration Profile for the associated span as per the
    hdsl2ShdslSpanConfAlarmProfile object in the
```


hdl2ShdslSpanConfTable. 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, hdl2ShdslEndpointAlarmConfProfileTable, MUST be rejected."

```
::= { hdl2ShdslEndpointConfEntry 3 }
```

```
-- Segment Endpoint Current Status/Performance Group
```

```
--
```

hdl2ShdslEndpointCurrTable OBJECT-TYPE

SYNTAX SEQUENCE OF Hdl2ShdslEndpointCurrEntry

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 indexed by ifIndex, entries in this table MUST be maintained in a persistent manner."

```
::= { hdl2ShdslMibObjects 5 }
```

hdl2ShdslEndpointCurrEntry OBJECT-TYPE

SYNTAX Hdl2ShdslEndpointCurrEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the hdl2ShdslEndpointCurrTable. 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, hdl2ShdslInvIndex, hdl2ShdslEndpointSide, hdl2ShdslEndpointWirePair }

```
::= { hdl2ShdslEndpointCurrTable 1 }
```

Hdl2ShdslEndpointCurrEntry ::=

SEQUENCE

```
{
hdl2ShdslEndpointCurrAtn                Integer32,
hdl2ShdslEndpointCurrSnrMgn             Integer32,
hdl2ShdslEndpointCurrStatus             BITS,
hdl2ShdslEndpointES                     Counter32,
hdl2ShdslEndpointSES                     Counter32,
hdl2ShdslEndpointCRCAnomalies           Counter32,
hdl2ShdslEndpointLOSWS                  Counter32,
hdl2ShdslEndpointUAS                    Counter32,
hdl2ShdslEndpointCurr15MinTimeElapsed
```



```

                                Hdsl2ShdslPerfTimeElapsed,
hdsl2ShdslEndpointCurr15MinES          PerfCurrentCount,
hdsl2ShdslEndpointCurr15MinSES          PerfCurrentCount,
hdsl2ShdslEndpointCurr15MinCRCAnomalies PerfCurrentCount,
hdsl2ShdslEndpointCurr15MinLOSWS        PerfCurrentCount,
hdsl2ShdslEndpointCurr15MinUAS          PerfCurrentCount,
hdsl2ShdslEndpointCurr1DayTimeElapsed
                                Hdsl2ShdslPerfTimeElapsed,
hdsl2ShdslEndpointCurr1DayES
                                Hdsl2ShdslPerfCurrDayCount,
hdsl2ShdslEndpointCurr1DaySES
                                Hdsl2ShdslPerfCurrDayCount,
hdsl2ShdslEndpointCurr1DayCRCAnomalies
                                Hdsl2ShdslPerfCurrDayCount,
hdsl2ShdslEndpointCurr1DayLOSWS
                                Hdsl2ShdslPerfCurrDayCount,
hdsl2ShdslEndpointCurr1DayUAS
                                Hdsl2ShdslPerfCurrDayCount,
hdsl2ShdslEndpointCurrTipRingReversal  INTEGER,
hdsl2ShdslEndpointCurrActivationState  INTEGER
}

```

hdsl2ShdslEndpointCurrAtn OBJECT-TYPE

```

SYNTAX      Integer32(-127..128)
UNITS       "dB"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The current loop attenuation for this endpoint as reported in
    a Network or Customer Side Performance Status message."
REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hdsl2ShdslEndpointCurrEntry 1 }

```

hdsl2ShdslEndpointCurrSnrMgn OBJECT-TYPE

```

SYNTAX      Integer32(-127..128)
UNITS       "dB"
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The current SNR margin for this endpoint as reported in a
    Status Response/SNR message."
REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
 ::= { hdsl2ShdslEndpointCurrEntry 2 }

```

hdsl2ShdslEndpointCurrStatus OBJECT-TYPE

```

SYNTAX      BITS
            {
                noDefect(0),

```



```
powerBackoff(1),
deviceFault(2),
dcContinuityFault(3),
snrMarginAlarm(4),
loopAttenuationAlarm(5),
loswFailureAlarm(6),
configInitFailure(7),
protocolInitFailure(8),
noNeighborPresent(9),
loopbackActive(10)
}
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Contains the current state of the endpoint. This is a bit-map of possible conditions. The various bit positions are:

noDefect	There are no defects on the line.
powerBackoff	Indicates enhanced Power Backoff.
deviceFault	Indicates 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."

REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hdsl2ShdslEndpointCurrEntry 3 }

hdlsl2ShdslEndpointES OBJECT-TYPE

SYNTAX Counter32

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Count of Errored Seconds (ES) on this endpoint since the xU
was last restarted."

REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hdsl2ShdslEndpointCurrEntry 4 }

hdlsl2ShdslEndpointSES OBJECT-TYPE

SYNTAX Counter32

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Count of Severely Errored Seconds (SES) on this endpoint
since the xU was last restarted."

REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hdsl2ShdslEndpointCurrEntry 5 }

hdlsl2ShdslEndpointCRCAnomalies OBJECT-TYPE

SYNTAX Counter32

UNITS "detected CRC Anomalies"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Count of CRC anomalies on this endpoint since the xU was
last restarted."

REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hdsl2ShdslEndpointCurrEntry 6 }

hdlsl2ShdslEndpointLOSWS OBJECT-TYPE

SYNTAX Counter32

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

hdl2ShdslEndpointUAS 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 }

hdl2ShdslEndpointCurr15MinTimeElapsed OBJECT-TYPE

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

hdl2ShdslEndpointCurr15MinES 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 }

hdl2ShdslEndpointCurr15MinSES OBJECT-TYPE

SYNTAX PerfCurrentCount
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Count of Severely Errored Seconds (SES) in the current
15-minute interval."

REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hdsl2ShdslEndpointCurrEntry 11 }

hdlsl2ShdslEndpointCurr15MinCRCAnomalies OBJECT-TYPE

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

hdlsl2ShdslEndpointCurr15MinLOSWS OBJECT-TYPE

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

hdlsl2ShdslEndpointCurr15MinUAS OBJECT-TYPE

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

hdlsl2ShdslEndpointCurr1DayTimeElapsed OBJECT-TYPE

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

hdlsl2ShdslEndpointCurr1DayES OBJECT-TYPE

SYNTAX Hdsl2ShdslPerfCurrDayCount
UNITS "seconds"

MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Count of Errored Seconds (ES) during the current day as
measured by hds12ShdslEndpointCurr1DayTimeElapsed."
REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hds12ShdslEndpointCurrEntry 16 }

hds12ShdslEndpointCurr1DaySES OBJECT-TYPE

SYNTAX Hds12ShdslPerfCurrDayCount
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Count of Severely Errored Seconds (SES) during the current
day as measured by hds12ShdslEndpointCurr1DayTimeElapsed."
REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hds12ShdslEndpointCurrEntry 17 }

hds12ShdslEndpointCurr1DayCRCAnomalies OBJECT-TYPE

SYNTAX Hds12ShdslPerfCurrDayCount
UNITS "detected CRC Anomalies"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Count of CRC anomalies during the current day as measured
by hds12ShdslEndpointCurr1DayTimeElapsed."
REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hds12ShdslEndpointCurrEntry 18 }

hds12ShdslEndpointCurr1DayLOSWS OBJECT-TYPE

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

hds12ShdslEndpointCurr1DayUAS OBJECT-TYPE

SYNTAX Hds12ShdslPerfCurrDayCount
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Count of Unavailable Seconds (UAS) during the current day as

measured by hds12ShdslEndpointCurr1DayTimeElapsed."
REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hds12ShdslEndpointCurrEntry 20 }

hds12ShdslEndpointCurrTipRingReversal OBJECT-TYPE

SYNTAX INTEGER
{
normal(1),
reversed(2)
}
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object indicates the state of the tip/ring for the
wire pair."
::= { 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](#)"

::= { hds12Shdsl15MinIntervalEntry 5 }

hds12Shdsl15MinIntervalUAS 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](#)"

::= { hds12Shdsl15MinIntervalEntry 6 }

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

--

hds12Shdsl1DayIntervalTable OBJECT-TYPE

SYNTAX SEQUENCE OF Hds12Shdsl1DayIntervalEntry

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 7 }

hds12Shdsl1DayIntervalEntry OBJECT-TYPE

SYNTAX Hds12Shdsl1DayIntervalEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the hds12Shdsl1DayIntervalTable."

INDEX { ifIndex, hds12ShdslInvIndex, hds12ShdslEndpointSide,
 hds12ShdslEndpointWirePair, hds12Shdsl1DayIntervalNumber }
 ::= { hds12Shdsl1DayIntervalTable 1 }

Hds12Shdsl1DayIntervalEntry ::=

SEQUENCE

```
{
  hds12Shdsl1DayIntervalNumber      Unsigned32,
  hds12Shdsl1DayIntervalMoniSecs    Hds12ShdslPerfTimeElapsed,
  hds12Shdsl1DayIntervalES          Hds12Shdsl1DayIntervalCount,
  hds12Shdsl1DayIntervalSES         Hds12Shdsl1DayIntervalCount,
  hds12Shdsl1DayIntervalCRCAnomalies Hds12Shdsl1DayIntervalCount,
  hds12Shdsl1DayIntervalLOSWS       Hds12Shdsl1DayIntervalCount,
  hds12Shdsl1DayIntervalUAS         Hds12Shdsl1DayIntervalCount
}
```

hds12Shdsl1DayIntervalNumber 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."

::= { hds12Shdsl1DayIntervalEntry 1 }

hds12Shdsl1DayIntervalMoniSecs 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."

::= { hds12Shdsl1DayIntervalEntry 2 }

hds12Shdsl1DayIntervalES OBJECT-TYPE

SYNTAX Hds12Shdsl1DayIntervalCount

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Count of Errored Seconds (ES) during the 1-day interval as

measured by hds12Shdsl1DayIntervalMoniSecs."
REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hds12Shdsl1DayIntervalEntry 3 }

hds12Shdsl1DayIntervalSES OBJECT-TYPE

SYNTAX Hds12Shdsl1DayIntervalCount
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Count of Severely Errored Seconds (SES) during the 1-day
interval as measured by hds12Shdsl1DayIntervalMoniSecs."
REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hds12Shdsl1DayIntervalEntry 4 }

hds12Shdsl1DayIntervalCRCAnomalies OBJECT-TYPE

SYNTAX Hds12Shdsl1DayIntervalCount
UNITS "detected CRC Anomalies"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Count of CRC anomalies during the 1-day interval as
measured by hds12Shdsl1DayIntervalMoniSecs."
REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hds12Shdsl1DayIntervalEntry 5 }

hds12Shdsl1DayIntervalLOSWS OBJECT-TYPE

SYNTAX Hds12Shdsl1DayIntervalCount
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Count of Loss of Sync Word (LOSW) Seconds during the 1-day
interval as measured by hds12Shdsl1DayIntervalMoniSecs."
REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hds12Shdsl1DayIntervalEntry 6 }

hds12Shdsl1DayIntervalUAS OBJECT-TYPE

SYNTAX Hds12Shdsl1DayIntervalCount
UNITS "seconds"
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"Count of Unavailable Seconds (UAS) during the 1-day interval
as measured by hds12Shdsl1DayIntervalMoniSecs."
REFERENCE "HDSL2 [Section 7.5.3.7](#); SHDSL [Section 9.5.5.7](#)"
::= { hds12Shdsl1DayIntervalEntry 7 }


```
-- Maintenance Group
--
```

hdl2ShdslEndpointMaintTable OBJECT-TYPE

SYNTAX SEQUENCE OF Hdsl2ShdslEndpointMaintEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table supports maintenance operations (e.g. loopbacks) to be performed on HDSL2/SHDSL segment endpoints. This table contains live data from equipment. As such, it is NOT persistent."

::= { hdsl2ShdslMibObjects 8 }

hdl2ShdslEndpointMaintEntry OBJECT-TYPE

SYNTAX Hdsl2ShdslEndpointMaintEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the hdsl2ShdslEndpointMaintTable. Each entry corresponds to a single segment endpoint, and is indexed by the ifIndex of the HDSL2/SHDSL line, the UnitId of the associated unit and the side of the unit."

INDEX { ifIndex, hdsl2ShdslInvIndex, hdsl2ShdslEndpointSide }

::= { hdsl2ShdslEndpointMaintTable 1 }

Hdsl2ShdslEndpointMaintEntry ::=

SEQUENCE

```
{
  hdsl2ShdslMaintLoopbackConfig      INTEGER,
  hdsl2ShdslMaintTipRingReversal     INTEGER,
  hdsl2ShdslMaintPowerBackOff        INTEGER,
  hdsl2ShdslMaintSoftRestart         INTEGER
}
```

hdl2ShdslMaintLoopbackConfig OBJECT-TYPE

SYNTAX INTEGER

```
{
  noLoopback(1),
  normalLoopback(2),
  specialLoopback(3)
}
```

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object controls configuration of loopbacks for the associated segment endpoint. The status of the loopback is obtained via the hdsl2ShdslEndpointCurrStatus object."


```
::= { hds12ShdslEndpointMaintEntry 1 }
```

hds12ShdslMaintTipRingReversal 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."

```
::= { hds12ShdslEndpointMaintEntry 2 }
```

hds12ShdslMaintPowerBackOff 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."

```
::= { hds12ShdslEndpointMaintEntry 3 }
```

hds12ShdslMaintSoftRestart 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."

```
::= { hds12ShdslEndpointMaintEntry 4 }
```

hds12ShdslUnitMaintTable OBJECT-TYPE

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

hdsl2ShdslUnitMaintEntry OBJECT-TYPE

SYNTAX Hdsl2ShdslUnitMaintEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "An entry in the hdsl2ShdslUnitMaintTable. Each entry
 corresponds to a single unit, and is indexed by the
 ifIndex of the HDSL2/SHDSL line and the UnitId of the
 associated unit."
INDEX { ifIndex, hdsl2ShdslInvIndex }
 ::= { hdsl2ShdslUnitMaintTable 1 }

Hdsl2ShdslUnitMaintEntry ::=

SEQUENCE
{
 hdsl2ShdslMaintLoopbackTimeout Integer32,
 hdsl2ShdslMaintUnitPowerSource INTEGER
}

hdsl2ShdslMaintLoopbackTimeout OBJECT-TYPE

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

hdsl2ShdslMaintUnitPowerSource OBJECT-TYPE

SYNTAX INTEGER
 {
 local(1),
 span(2)
 }
MAX-ACCESS read-only
STATUS current
DESCRIPTION


```

        "This object indicates the DC power source being used by the
        associated unit."
 ::= { hdsl2ShdslUnitMaintEntry 2 }

-- Span Configuration Profile Group
--

hdsl2ShdslSpanConfProfileTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Hdsl2ShdslSpanConfProfileEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table supports definitions of span configuration
        profiles for SHDSL lines.  HDSL2 does not support these
        configuration options.  This table MUST be maintained
        in a persistent manner."
 ::= { hdsl2ShdslMibObjects 10 }

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

Hdsl2ShdslSpanConfProfileEntry ::=
    SEQUENCE
    {
        hdsl2ShdslSpanConfProfileName          SnmpAdminString,
        hdsl2ShdslSpanConfWireInterface        INTEGER,
        hdsl2ShdslSpanConfMinLineRate          Unsigned32,
        hdsl2ShdslSpanConfMaxLineRate          Unsigned32,
        hdsl2ShdslSpanConfPSD                  INTEGER,
        hdsl2ShdslSpanConfTransmissionMode     Hdsl2ShdslTransmissionModeType,
        hdsl2ShdslSpanConfRemoteEnabled        INTEGER,
        hdsl2ShdslSpanConfPowerFeeding         INTEGER,
        hdsl2ShdslSpanConfCurrCondTargetMarginDown Integer32,

```



```

hds12ShdslSpanConfWorstCaseTargetMarginDown Integer32,
hds12ShdslSpanConfCurrCondTargetMarginUp    Integer32,
hds12ShdslSpanConfWorstCaseTargetMarginUp    Integer32,
hds12ShdslSpanConfUsedTargetMargins          BITS,
hds12ShdslSpanConfReferenceClock
                                Hdsl2ShdslClockReferenceType,
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 Hdsl2ShdslSpanConfEntry."
 ::= { 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 }

::= { hdsl2ShdslSpanConfProfileEntry 3 }

hdlsl2ShdslSpanConfMaxLineRate OBJECT-TYPE

SYNTAX Unsigned32(0..4294967295)

UNITS "bps"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object configures the maximum transmission rate for the associated SHDSL Line in bits-per-second (bps) and includes both payload (user data) and any applicable framing overhead. If the minimum line rate equals the maximum line rate (hdlsl2ShdslSpanMaxLineRate), the line rate is considered 'fixed'. If the minimum line rate is less than the maximum line rate, the line rate is considered 'rate-adaptive'."

DEFVAL { 1552000 }

::= { hdsl2ShdslSpanConfProfileEntry 4 }

hdlsl2ShdslSpanConfPSD OBJECT-TYPE

SYNTAX INTEGER

{
symmetric(1),
asymmetric(2)
}

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object configures use of symmetric/asymmetric PSD (Power Spectral Density) Mask for the associated SHDSL Line. Support for symmetric PSD is mandatory for all supported data rates. Support for asymmetric PSD is optional."

DEFVAL { symmetric }

::= { hdsl2ShdslSpanConfProfileEntry 5 }

hdlsl2ShdslSpanConfTransmissionMode OBJECT-TYPE

SYNTAX Hdsl2ShdslTransmissionModeType

MAX-ACCESS read-create

STATUS current

DESCRIPTION

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

DEFVAL { { region1 } }

::= { hdsl2ShdslSpanConfProfileEntry 6 }

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 a 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 a 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 a 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 a SHDSL line. The SNR margin is the difference between the desired SNR and the actual SNR. Target SNR margin is the desired SNR margin for a unit."

DEFVAL { 0 }

::= { hdsl2ShdslSpanConfProfileEntry 10 }

hdlsl2ShdslSpanConfCurrCondTargetMarginUp OBJECT-TYPE

SYNTAX Integer32(-10..21)

UNITS "dB"

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"This object specifies the upstream current condition target SNR margin for a 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 a 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

"Contains indicates whether a target SNR margin is enabled or disabled. This is a bit-map of possible settings. The various bit positions are:


```
currCondDown    - current condition downstream target SNR
                  margin enabled

worstCaseDown    - worst case downstream target SNR margin
                  enabled

currCondUp       - current condition upstream target SNR
                  margin enabled

worstCaseUp      - worst case upstream target SNR margin
                  enabled."
DEFVAL           { { currCondDown } }
::= { hdsl2ShdslSpanConfProfileEntry 13 }

hdsl2ShdslSpanConfReferenceClock OBJECT-TYPE
    SYNTAX       Hdsl2ShdslClockReferenceType
    MAX-ACCESS    read-create
    STATUS        current
    DESCRIPTION   "This object configures the clock reference for the STU-C
                  in a SHDSL Line."
    DEFVAL        { localClk }
    ::= { hdsl2ShdslSpanConfProfileEntry 14 }

hdsl2ShdslSpanConfLineProbeEnable 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 a SHDSL line.  When Line Probe is enabled, the
                  system performs Line Probing to find the best possible
                  rate.  If Line probe is disabled, the rate adaptation phase
                  is skipped to shorten set up time."
    DEFVAL        { disable }
    ::= { hdsl2ShdslSpanConfProfileEntry 15 }

hdsl2ShdslSpanConfProfileRowStatus 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."
 ::= { hds12ShdslMibObjects 11 }

hds12ShdslEndpointAlarmConfProfileEntry OBJECT-TYPE
 SYNTAX Hds12ShdslEndpointAlarmConfProfileEntry
 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 hds12ShdslEndpointAlarmConfProfileRowStatus. If an active entry is referenced in either hds12ShdslSpanConfAlarmProfile or hds12ShdslEndpointAlarmConfProfile, the entry MUST remain active until all references are removed."
 INDEX { IMPLIED hds12ShdslEndpointAlarmConfProfileName }
 ::= { hds12ShdslEndpointAlarmConfProfileTable 1 }

Hds12ShdslEndpointAlarmConfProfileEntry ::=

```

SEQUENCE
{
  hds12ShdslEndpointAlarmConfProfileName      SnmpAdminString,
  hds12ShdslEndpointThreshLoopAttenuation      Integer32,
  hds12ShdslEndpointThreshSNRMargin            Integer32,
  hds12ShdslEndpointThreshES                   Hds12ShdslPerfIntervalThreshold,
  hds12ShdslEndpointThreshSES                   Hds12ShdslPerfIntervalThreshold,
  hds12ShdslEndpointThreshCRCAnomalies         Integer32,
  hds12ShdslEndpointThreshLOSWS                Hds12ShdslPerfIntervalThreshold,
  hds12ShdslEndpointThreshUAS

```



```
                                Hdsl2ShdslPerfIntervalThreshold,
    hds12ShdslEndpointAlarmConfProfileRowStatus  RowStatus
}
```

```
hds12ShdslEndpointAlarmConfProfileName OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(1..32))
    MAX-ACCESS   not-accessible
    STATUS       current
    DESCRIPTION
        "This object is the unique index associated with this profile."
    ::= { hds12ShdslEndpointAlarmConfProfileEntry 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, a 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      Hdsl2ShdslPerfIntervalThreshold
    UNITS        "seconds"
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "This object configures the threshold for the number of
        errored seconds (ES) within any given 15-minute performance
        data collection interval.  If the value of errored seconds
        in a particular 15-minute collection interval reaches/
```


exceeds this value, a 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, a 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, a hds12ShdslPerfCRCAnomaliesThresh MAY be generated. At most one notification will be sent per interval per endpoint."

DEFVAL { 0 }

::= { hds12ShdslEndpointAlarmConfProfileEntry 6 }

hds12ShdslEndpointThreshLOSW 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 (LOSW) Seconds within any given 15-minute performance data collection interval. If the value of LOSW in a particular 15-minute collection interval reaches/exceeds

this value, a 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, a 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 a HDSL2/SHDSL line via the hdsl2ShdslSpanConfNumRepeaters object and the actual number of repeater/regenerator units discovered via the EOC."
::= { hdsl2ShdslNotifications 8 }

hdlsl2ShdslLoopbackFailure NOTIFICATION-TYPE

OBJECTS

```
{  
  hdsl2ShdslMaintLoopbackConfig  
}
```

STATUS current

DESCRIPTION

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

::= { hdsl2ShdslNotifications 9 }

hdlsl2ShdslpowerBackoff NOTIFICATION-TYPE

OBJECTS

```
{  
  hdsl2ShdslEndpointCurrStatus  
}
```

STATUS current

DESCRIPTION

"This notification indicates that the bit setting for powerBackoff in the hdsl2ShdslEndpointCurrStatus object for this endpoint has changed."

::= { hdsl2ShdslNotifications 10 }

hdlsl2ShdsldeviceFault NOTIFICATION-TYPE

OBJECTS

```
{  
  hdsl2ShdslEndpointCurrStatus  
}
```

STATUS current

DESCRIPTION

"This notification indicates that the bit setting for deviceFault in the hdsl2ShdslEndpointCurrStatus object for this endpoint has changed."

::= { hdsl2ShdslNotifications 11 }

hdlsl2ShdslcdcContinuityFault NOTIFICATION-TYPE

OBJECTS

```
{  
  hdsl2ShdslEndpointCurrStatus  
}
```

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 current  
    DESCRIPTION  
        "The section outlines compliance requirements for this MIB."  
    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."

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 }

-- 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."

::= { hdsl2ShdslGroups 4 }

hdl2ShdslInventoryGroup OBJECT-GROUP

OBJECTS

```
{
  hdsl2ShdslInvVendorID,
  hdsl2ShdslInvVendorModelNumber,
  hdsl2ShdslInvVendorSerialNumber,
  hdsl2ShdslInvVendorEOCSoftwareVersion,
  hdsl2ShdslInvStandardVersion,
  hdsl2ShdslInvVendorListNumber,
  hdsl2ShdslInvVendorIssueNumber,
  hdsl2ShdslInvVendorSoftwareVersion,
  hdsl2ShdslInvEquipmentCode,
  hdsl2ShdslInvVendorOther
}
```

STATUS current

DESCRIPTION

"This group supports objects that provide unit inventory information about the units in HDSL2/SHDSL lines."

::= { hdsl2ShdslGroups 5 }

hdl2ShdslEndpointConfGroup OBJECT-GROUP

OBJECTS

```
{
  hdsl2ShdslEndpointCurrAtn
}
```

STATUS current

DESCRIPTION

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

::= { hdsl2ShdslGroups 6 }

hdl2ShdslEndpointCurrGroup OBJECT-GROUP

OBJECTS

```
{
  hdsl2ShdslEndpointCurrAtn,
  hdsl2ShdslEndpointCurrSnrMgn,
  hdsl2ShdslEndpointCurrStatus,
  hdsl2ShdslEndpointES,
  hdsl2ShdslEndpointSES,
  hdsl2ShdslEndpointCRCAnomalies,
  hdsl2ShdslEndpointLOSWS,
  hdsl2ShdslEndpointUAS,
  hdsl2ShdslEndpointCurr15MinTimeElapsed,
}
```



```
hds12ShdslEndpointCurr15MinES,  
hds12ShdslEndpointCurr15MinSES,  
hds12ShdslEndpointCurr15MinCRCAnomalies,  
hds12ShdslEndpointCurr15MinLOSWS,  
hds12ShdslEndpointCurr15MinUAS,  
hds12ShdslEndpointCurr1DayTimeElapsed,  
hds12ShdslEndpointCurr1DayES,  
hds12ShdslEndpointCurr1DaySES,  
hds12ShdslEndpointCurr1DayCRCAnomalies,  
hds12ShdslEndpointCurr1DayLOSWS,  
hds12ShdslEndpointCurr1DayUAS  
}
```

STATUS current

DESCRIPTION

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

::= { hds12ShdslGroups 7 }

hds12Shdsl15MinIntervalGroup OBJECT-GROUP

OBJECTS

```
{  
hds12Shdsl15MinIntervalES,  
hds12Shdsl15MinIntervalSES,  
hds12Shdsl15MinIntervalCRCAnomalies,  
hds12Shdsl15MinIntervalLOSWS,  
hds12Shdsl15MinIntervalUAS  
}
```

STATUS current

DESCRIPTION

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

::= { hds12ShdslGroups 8 }

hds12Shdsl1DayIntervalGroup OBJECT-GROUP

OBJECTS

```
{  
hds12Shdsl1DayIntervalMoniSecs,  
hds12Shdsl1DayIntervalES,  
hds12Shdsl1DayIntervalSES,  
hds12Shdsl1DayIntervalCRCAnomalies,  
hds12Shdsl1DayIntervalLOSWS,  
hds12Shdsl1DayIntervalUAS  
}
```

STATUS current

DESCRIPTION

"This group supports objects which maintain historic


```
    performance measurements relating to segment endpoints in
    HDSL2/SHDSL lines in 1-day intervals."
 ::= { hdsl2ShdslGroups 9 }
```

hdlsl2ShdslMaintenanceGroup OBJECT-GROUP

OBJECTS

```
{
 hdsl2ShdslMaintLoopbackConfig,
 hdsl2ShdslMaintTipRingReversal,
 hdsl2ShdslMaintPowerBackOff,
 hdsl2ShdslMaintSoftRestart,
 hdsl2ShdslMaintLoopbackTimeout,
 hdsl2ShdslMaintUnitPowerSource
}
```

STATUS current

DESCRIPTION

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

```
::= { hdsl2ShdslGroups 10 }
```

hdlsl2ShdslEndpointAlarmConfGroup OBJECT-GROUP

OBJECTS

```
{
 hdsl2ShdslEndpointAlarmConfProfile,
 hdsl2ShdslEndpointThreshLoopAttenuation,
 hdsl2ShdslEndpointThreshSNRMargin,
 hdsl2ShdslEndpointThreshES,
 hdsl2ShdslEndpointThreshSES,
 hdsl2ShdslEndpointThreshCRCAnomalies,
 hdsl2ShdslEndpointThreshLOSWS,
 hdsl2ShdslEndpointThreshUAS,
 hdsl2ShdslEndpointAlarmConfProfileRowStatus
}
```

STATUS current

DESCRIPTION

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

```
::= { hdsl2ShdslGroups 11 }
```

hdlsl2ShdslNotificationGroup NOTIFICATION-GROUP

NOTIFICATIONS

```
{
 hdsl2ShdslLoopAttenCrossing,
 hdsl2ShdslSNRMarginCrossing,
 hdsl2ShdslPerfESThresh,
 hdsl2ShdslPerfSESThresh,
 hdsl2ShdslPerfCRCAnomaliesThresh,
}
```



```
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,
```



```
hdsl2ShdslEndpointCurrActivationState
}
STATUS      current
DESCRIPTION
  "This group supports objects which provide the status
    of SHDSL-specific wire pairs."
 ::= { hdsl2ShdslGroups 14 }

hdsl2ShdslPayloadRateGroup OBJECT-GROUP
OBJECTS
{
  hdsl2ShdslStatusMaxAttainablePayloadRate,
  hdsl2ShdslStatusActualPayloadRate
}
STATUS      current
DESCRIPTION
  "This group supports object for retrieving payload rates
    which excludes any framing overhead."
 ::= { hdsl2ShdslGroups 15 }

END
```

7. Implementation Analysis

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

```
hdsl2ShdslEndpointCurrAtn.1.1.1.2
```

might return

```
hdsl2ShdslEndpointCurrAtn.1.1.1.3 = 0
```

with a G.shdsl.bis unit and

```
hdsl2ShdslEndpointCurrSnrMgn.1.1.1.1 = 0
```

with an HDLSL2 unit as these objects are indexed by

```
INDEX { ifIndex, hdsl2ShdslInvIndex, hdsl2ShdslEndpointSide,
        hdsl2ShdslEndpointWirePair }
```


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

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

8. 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.

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.

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 the 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.

Blocking unauthorized access to the HDSL2-SHDSL MIB via the element management system is outside the scope of this document. It should be noted that access to the MIB permits the unauthorized entity to modify the profiles such that both subscriber service and network

operations can be interfered with. Subscriber service can be altered by modifying any of a number of service characteristics such as rate partitioning and maximum transmission rates. Network operations can be impacted by modification of notification thresholds such as SES thresholds.

There are a number of managed objects in this MIB that may be considered to contain sensitive information. 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.

These identifying objects in the inventory group are:

- hds12ShdslInvVendorID
- hds12ShdslInvVendorModelNumber
- hds12ShdslInvVendorSerialNumber
- hds12ShdslInvVendorEOCSsoftwareVersion
- hds12ShdslInvStandardVersion
- hds12ShdslInvVendorListNumber
- hds12ShdslInvVendorIssueNumber
- hds12ShdslInvVendorSoftwareVersion
- hds12ShdslInvEquipmentCode
- hds12ShdslInvVendorOther
- hds12ShdslInvTransmissionModeCapability

Therefore, it may be important in some environments to control read access to these objects and possibly to even encrypt the values of these object when sending them over the network via SNMP. Not all versions of SNMP provide features for such a secure environment.

It is recommended that the implementors consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model [RFC 3414](#) [[RFC3414](#)] and the View-based Access Control Model [RFC 3415](#) [[RFC3415](#)] are recommended.

It is then the customer/user's responsibility to ensure that the SNMP entity giving access to an instance of this MIB, is properly configured to give access to those objects only to those principals (users) that have legitimate rights to access them.

HDSL2-SHDSL layer connectivity from the xtuR will permit the subscriber to manipulate both the HDSL2-SHDSL link directly and the HDSL2-SHDSL embedded operations channel (EOC) for their own loop. For example, unchecked or unfiltered fluctuations initiated by the subscriber could generate sufficient notifications to potentially overwhelm either the management interface to the network or the element manager.

It should be noted that interface indices in this MIB are maintained persistently. View-based Access Control Model (VACM) data relating to these should be stored persistently.

There are a number of management objects defined in this MIB that have 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.

It is conceivable that a management application that was designed to support G.SHDSL as defined in [RFC 3276](#) [[RFC3276](#)] could be broken by a G.shdsl.bis agent which reports objects for additional wire pairs (as noted in [Section 7](#)).

For example, if a management application blindly loaded object instances into an array until the object changes (during repeated GET-NEXT requests). It is anticipated that the modifications to the management application code would be straightforward.

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10. References

10.1 Normative References

- [G.991.2] Blackwell, S., "Single-Pair High-Speed Digital Subscriber Line (SHDSL) Transceivers", ITU-T G.991.2, December 2003.
- [RFC1155] Rose, M. and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based Internets", [RFC 1155](#), May 1990.
- [RFC1157] Case, J., Fedor, M. and J. Davis, "Simple Network Management Protocol", STD 15, [RFC 1157](#), May 1990.
- [RFC1212] Rose, M. and K. McCloghrie, "Concise MIB Definitions", STD 16, [RFC 1212](#), March 1991.
- [RFC1215] Rose, M., "A Convention for Defining Traps for use with the SNMP", [RFC 1215](#), March 1991.
- [RFC1901] Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Introduction to Community-based SNMPv2", [RFC 1901](#), January 1996.
- [RFC2119] Brandner, S., "Key Words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, [RFC 2578](#), April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, [RFC 2579](#), April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Conformance Statements for SMIv2", STD 58, [RFC 2580](#), April 1999.
- [RFC2662] Bathrick, G. and F. Ly, "Definitions of Managed Objects for the ADSL Lines", [RFC 2662](#), August 1999.
- [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", [RFC 2863](#), June 2000.
- [RFC3020] Pate, P., Lynch, B. and K. Rehbehn, "Definitions of Managed Objects for Monitoring and Controlling the UNI/NNI Multilink Frame Relay Function", [RFC 3020](#), December 2000.
- [RFC3276] Ray, B. and R. Abbi, "Definitions of Managed Objects for High Bit-Rate DSL - 2nd generation (HDSL2) and Single-Pair High-Speed Digital Subscriber Line (SHDSL) Lines", [RFC 3276](#), May 2003.
- [RFC3411] Harrington, D., Presuhn, R. and B. Wijnen, "An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks", STD 62, [RFC 3411](#), December 2002.
- [RFC3412] Case, J., Harrington, D., Presuhn, R. and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", STD 62, [RFC 3412](#), December 2002.
- [RFC3413] Levi, D., Meyer, P. and B. Stewart, "Simple Network Management Protocol (SNMP) Applications", STD 62, [RFC 3413](#), December 2002.
- [RFC3414] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", STD 62, [RFC 3414](#), December 2002.
- [RFC3416] Presuhn, R., Case, J., McCloghrie, K., Rose, M. and S.

Waldbusser, "Version 2 of Protocol Operations for the Simple Network Management Protocol (SNMP)", STD 62, [RFC 3416](#), December 2002.

[RFC3417] Presuhn, R., Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Transport Mappings for the Simple Network Management Protocol (SNMP)", STD 62, [RFC 3417](#), December 2002.

[RFC3418] Presuhn, R., Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)", STD 62, [RFC 3418](#), December 2002.

[RFC3593] Tesink, K., "Textual Conventions for MIB Modules Using Performance History Based on 15 Minute Intervals", [RFC 3593](#), September 2003.

[T1.213-2001]
"Coded Identification of Equipment Entities of the North American Telecommunications System for the Purpose of Information Exchange", T1.213-2001.

[T1E1.4] American National Standards Institute, "ANSI T1E1.4/2000-006", February 2000.

10.2 Informative References

[RFC3410] Case, J., Mindy, R., Partain, D. and B. Stewart, "Introduction and Applicability Statements for Internet Standard Management Framework", [RFC 3416](#), December 2002.

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

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