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                                                       May 26, 2005

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

Copyright Notice

Abstract

   This document defines a Management Information Base (MIB) module for
   use with network management protocols in the Internet community. In
   particular, it describes objects used for managing High Bit-Rate
   Digital Subscriber Line (DSL) - 2nd generation (HDSL2) and Single-

   Pair High-Speed Digital Subscriber Line (SHDSL) interfaces. This
   document introduces extensions to several objects and textual
   conventions defined in HDSL2-SHDSL-Line MIB (RFC 3276). This
   document obsoletes RFC 3276.

Table of Contents

1. The Internet-Standard Management Framework

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

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

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

2. Overview

This document defines a Management Information Base (MIB) module for
use with network management protocols in the Internet community for
the purpose of managing HDSL2/SHDSL Lines.

The MIB module described in RFC 3276 [RFC3276] describes objects used
for managing High Bit-Rate DSL - 2nd generation (HDSL2) [T1E1.4] and
Single-Pair High-Speed Digital Subscriber Line (SHDSL) interfaces
[G.991.2]. These object descriptions are based upon the
specifications for the HDSL2 and SHDSL Embedded Operations Channel
(EOC) as defined in American National Standards Institute (ANSI)
T1E1.4/2000-006 [T1E1.4] and International Telecommunication Union
(ITU) G.991.2 [G.991.2].

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

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

2.1 Relationship to other MIBs

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

2.1.1 **General IF-MIB Integration (RFC 2863)**

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

       IANAifType ::= TEXTUAL-CONVENTION
           ...
       SYNTAX INTEGER {
           ...
           hdsl2 (168), -- High Bit-Rate DSL, 2nd generation
           shdsl (169), -- Multirate HDSL2
           ...
           }

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

2.1.2 **Usage of ifTable**

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

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

```
   ================================================================

      ifIndex                 Interface index.

      ifDescr                 See interfaces MIB [RFC2863].

      ifType                  hdsl2(168) or shdsl(169).

      ifSpeed                 Set as appropriate.
                              (This is fixed at 1552000 for HDSL2
                              lines)

      ifPhysAddress           This object MUST have an octet string
                              with zero length.

      ifAdminStatus           See interfaces MIB [RFC2863].

      ifOperStatus            See interfaces MIB [RFC2863].

      ifLastChange            See interfaces MIB [RFC2863].

      ifName                  See interfaces MIB [RFC2863].

      ifAlias                 See interfaces MIB [RFC2863].

      ifLinkUpDownTrapEnable  Default to enabled(1).

      ifHighSpeed             Set as appropriate.
                              (For HDSL2 lines, this is fixed at 2)

      ifConnectorPresent      Set as appropriate.

   ================================================================
                    Figure 1: Use of ifTable Objects
```

2.2 IANA Considerations

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

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

2.3 Conventions used in the MIB Module

2.3.1 Naming Conventions

   A. xtuC refers to a central site terminal unit;
       H2TU-C for HDSL2, or STU-C for SHDSL.
   B. xtuR refers to a remote site terminal unit;
       H2TU-R for HDSL2, or STU-R for SHDSL.
   C. xtu refers to a terminal unit; either an xtuC or xtuR.
   D. xru refer to a regenerator unit;
       H2RU for HDSL2, or SRU for SHDSL.
   E. xU refers to any HDSL2/SHDSL unit; either an xtu or xru.
   F. CRC is cyclic redundancy check [G.991.2].
   G. ES means errored second [G.991.2].
   J. LOSW means loss of sync word [G.991.2].
   I. LOSWS means LOSW seconds [G.991.2].
   J. SES means severely errored second [G.991.2].
   K. SNR means signal-to-noise ratio [G.991.2].
   L. UAS means unavailable second [G.991.2].

2.3.2 Textual Conventions

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

   o Hdsl2ShdslUnitId:

      Attributes with this syntax uniquely identify each unit in 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 module.

o Hdsl2Shdsl1DayIntervalCount:

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

o Hdsl2ShdslPerfTimeElapsed:

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

o Hdsl2ShdslPerfIntervalThreshold:

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

o Hdsl2ShdslClockReferenceType:

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

2.4 Structure

The MIB module is structured into 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
              - hdsl2ShdslPerfLOSWSThresh
              - 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.

            - hdsl2ShdslEndpointCurrTipRingReversal
            - hdsl2ShdslEndpointCurrActivationState

o   Payload Group:

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

            - hdsl2ShdslStatusMaxAttainablePayloadRate
            - hdsl2ShdslStatusActualPayloadRate

2.5 Line Topology

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


```
    <-- Network Side                            Customer Side -->

    |<////////////////// HDSL2/SHDSL Span //////////////////>|

            <~~~>         <~~~> HDSL2/SHDSL Segments  <~~~>

    +-------+   +-------+   +-------+       +-------+   +-------+
    +       C=1=N         C=1=N         C=..1..=N         C=1=N       +
    | xtuC  |   | xru1 |   | xru2 |       | xru8 |   | xtuR |
    +       C=2=N         C=2=N         C=..2..=N         C=2=N       +
    +-------+   +-------+   +-------+       +-------+   +-------+

    Key:  <////> HDSL2/SHDSL Span
          <~~~~> HDSL2/SHDSL Segment
          =1=    HDSL2/SHDSL wire-pair-1
          =2=    SHDSL optional wire-pair-2 (Not applicable to HDSL2)
          C      Customer Side Segment Endpoint (modem)
          N      Network Side Segment Endpoint (modem)
```
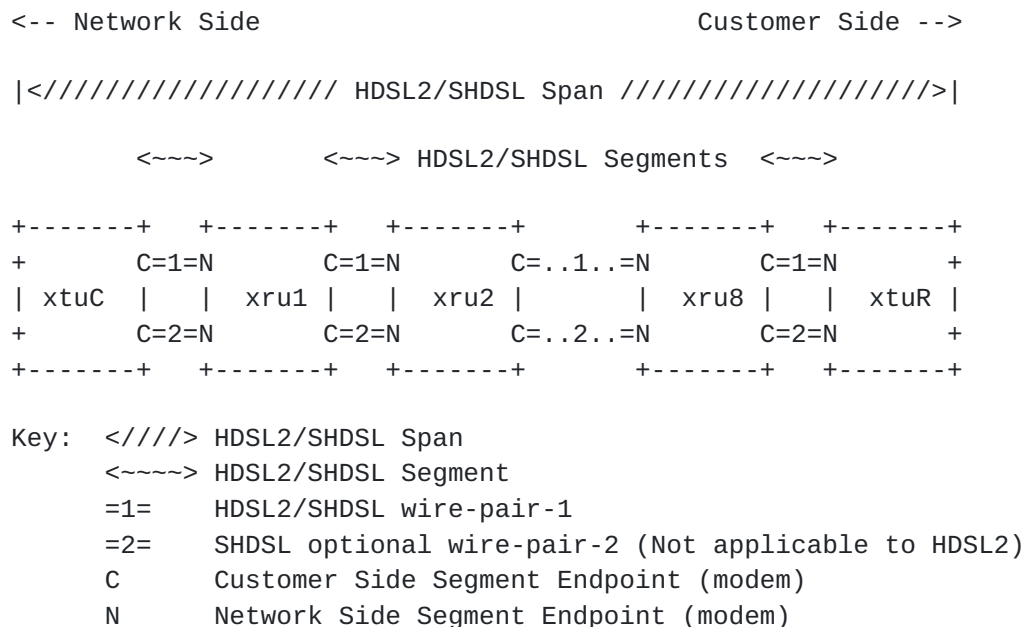
Figure 2: General topology for an HDSL2/SHDSL Line

2.6 **Counters, Interval Buckets and Thresholds**

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

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

   Not reporting an interval will result in holes in the associated
   table. For example, the table, hdsl2Shdsl15MinIntervalTable, is
   indexed by { ifIndex, hdsl2ShdslInvIndex, hdsl2ShdslEndpointSide,
   hdsl2ShdslEndpointWirePair, hdsl2Shdsl15MinIntervalNumber}. 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 module).

2.7 **Profiles**

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

   The following profiles are used in this MIB module:

   o Span Configuration Profiles - Span configuration profiles contain
      parameters for configuring HDSL2/SHDSL spans. They are defined in
      the hdsl2ShdslSpanConfProfileTable. Since span configuration

parameters are only applicable for SHDSL, the support for span
configuration profiles 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
   hdsl2ShdslEndpointAlarmConfProfileTable.

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

One or more lines may be configured to share parameters of a single
profile (e.g., hdsl2ShdslEndpointAlarmConfProfile = 'silver') by
setting its hdsl2ShdslEndpointAlarmConfProfile objects to the value
of this profile. If a change is made to the profile, all lines that
refer to it will be reconfigured to the changed parameters. Before a
profile can be deleted or taken out of service it must be first
unreferenced from all associated lines.

Implementations MUST provide a default profile whose name is 'DEFVAL'
for each profile type. The values of the associated parameters will
be vendor specific unless otherwise indicated in this document.
Before a line's profiles have been set, these profiles will be
automatically used by setting hdsl2ShdslEndpointAlarmConfProfile and
hdsl2ShdslSpanConfProfile to 'DEFVAL' where appropriate. This
default profile name, 'DEFVAL', is considered reserved in the context
of profiles defined in this MIB module.

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

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

2.8 Notifications

The ability to generate the SNMP notifications coldStart/WarmStart
(per [RFC3418]) which are per agent (e.g., per Digital Subscriber
Line Access Multiplexer, or DSLAM, in such a device), and linkUp/

linkDown (per [RFC2863]) which are per interface (i.e., HDSL2/SHDSL
line) is required.

A linkDown notification MAY be generated whenever any 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 module are for initialization
failure and for the threshold crossings associated with the following
events: ES, SES, CRC Anomaly, LOSW, and UAS. Each threshold has its
own enable/threshold value. When that value is 0, the notification
is disabled.

The hdsl2ShdslEndpointCurrStatus 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 module, these alarm conditions are
tied to the two thresholds hdsl2ShdslEndpointThreshSNRMargin and
hdsl2ShdslEndpointThreshLoopAttenuation found in the
hdsl2ShdslEndpointAlarmConfProfileTable. In the EOC, the alarm
conditions associated with these thresholds are per-unit. In the MIB
module, these alarm conditions are per-endpoint. For terminal units,
this has no impact. For repeaters, this implies an implementation
variance where the agent in the terminal unit is responsible for
detecting a threshold crossing. As the reporting of a repeater
detected alarm condition to the polling terminal unit occurs in the
same EOC message as the reporting of the current SNR Margin and Loop
Attenuation values, it is anticipated that this will have very little
impact on agent implementation.

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

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

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

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

3. Definitions

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

IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    Counter32,
    Unsigned32,
    Gauge32,
    NOTIFICATION-TYPE,
    Integer32,
    transmission
        FROM SNMPv2-SMI
    RowStatus,
    TEXTUAL-CONVENTION
        FROM SNMPv2-TC
    ifIndex
        FROM IF-MIB
    PerfCurrentCount,
    PerfIntervalCount
        FROM PerfHist-TC-MIB

         SnmpAdminString
             FROM SNMP-FRAMEWORK-MIB
         MODULE-COMPLIANCE,
         OBJECT-GROUP,
         NOTIFICATION-GROUP
             FROM SNMPv2-CONF;

    hdsl2ShdslMIB MODULE-IDENTITY
        LAST-UPDATED "200505260000Z" -- May 26, 2005
        ORGANIZATION "ADSLMIB Working Group"
        CONTACT-INFO "WG-email: adslmib@ietf.org
            WG-URL:
                http://www.ietf.org/html.charters/adslmib-charter.html
            Info: https://www1.ietf.org/mailman/listinfo/adslmib
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        DESCRIPTION

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

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

     REVISION   "200505260000Z" -- May 26, 2005
     DESCRIPTION "This version, published as RFC xxxx.
           The following changes have been made in this version:
             1. Added a 3rd and 4th wire pair.
             2. Modified all rates such that their rates are only
                 constrained by an unsigned 32-bit value and not by
                 what today's perceived technology limitations are.
             3. Clarified that the rates from RFC 3276 include
                 payload and any applicable framing and added
                 objects for payload-only rates.
             4. Added an object to indicate whether 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 module
     --

     Hdsl2ShdslPerfCurrDayCount ::= TEXTUAL-CONVENTION
        DISPLAY-HINT "d"
        STATUS   current
        DESCRIPTION
          "A gauge associated with interface performance measurements in

         a current 1-day (24 hour) measurement interval.

         The value of this gauge starts at zero at the beginning of an
         interval and is increased when associated events occur, until
         the end of the 1-day interval. At that time the value of the
         gauge is stored in the previous 1-day history interval, as
         defined in a companion object of type
         Hdsl2Shdsl1DayIntevalCount, and the current interval gauge
         is restarted at zero.

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

   Hdsl2Shdsl1DayIntervalCount ::= TEXTUAL-CONVENTION
      DISPLAY-HINT "d"
      STATUS   current
      DESCRIPTION
        "A counter associated with interface performance measurements
         during the most previous 1-day (24 hour) measurement interval.
         The value of this gauge is equal to the value of the current
         day gauge, as defined in a companion object of type
         Hdsl2ShdslPerfCurrDayCount, at the end of its most recent
         interval.

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

   Hdsl2ShdslPerfTimeElapsed ::= TEXTUAL-CONVENTION
      DISPLAY-HINT "d"
      STATUS   current
      DESCRIPTION
        "The number of seconds that have elapsed since the beginning of
         the current measurement period. If, for some reason, such as
         an adjustment in the system's time-of-day clock or the addition
         of a leap second, the current interval exceeds the maximum
         value, the agent will return the maximum value.

         For 15 minute intervals, the range is limited to (0..899).
         For 24 hour intervals, the range is limited to (0..86399)."
      SYNTAX   Unsigned32(0..86399)

    Hdsl2ShdslPerfIntervalThreshold ::= TEXTUAL-CONVENTION
        DISPLAY-HINT "d"
        STATUS   current
        DESCRIPTION
          "This convention defines a range of values that may be set in
           a fault threshold alarm control. As the number of seconds in
           a 15-minute interval numbers at most 900, objects of this type
           may have a range of 0...900, where the value of 0 disables the
           alarm."
        SYNTAX   Unsigned32(0..900)

    Hdsl2ShdslUnitId ::= TEXTUAL-CONVENTION
        STATUS   current
        DESCRIPTION
          "This is the unique identification for all units in 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
--

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

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

   hdsl2ShdslSpanConfEntry OBJECT-TYPE
      SYNTAX       Hdsl2ShdslSpanConfEntry
      MAX-ACCESS   not-accessible
      STATUS       current
      DESCRIPTION
        "An entry in the hdsl2ShdslSpanConfTable.  Each entry
         represents the complete Span in a single HDSL2/SHDSL line.
         It is indexed by the ifIndex of the associated HDSL2/SHDSL
         line."
      INDEX { ifIndex }
      ::= { hdsl2ShdslSpanConfTable 1 }

   Hdsl2ShdslSpanConfEntry ::=
      SEQUENCE
      {
      hdsl2ShdslSpanConfNumRepeaters           Unsigned32,
      hdsl2ShdslSpanConfProfile                SnmpAdminString,
      hdsl2ShdslSpanConfAlarmProfile           SnmpAdminString
      }

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

   hdsl2ShdslSpanConfProfile OBJECT-TYPE
      SYNTAX       SnmpAdminString (SIZE(1..32))
      MAX-ACCESS   read-write
      STATUS       current
      DESCRIPTION
        "This object is a pointer to a span configuration profile in
         the hdsl2ShdslSpanConfProfileTable, which applies to this
         span.  The value of this object is the index of the referenced
         profile in the hdsl2ShdslSpanConfProfileTable.  Note that span
         configuration profiles are only applicable to SHDSL lines.

         HDSL2 lines MUST reference the default profile, 'DEFVAL'.
```

```
        By default, this object will have the value 'DEFVAL'
        (the index of the default profile).

        Any attempt to set this object to a value that is not the value
        of the index for an active entry in the profile table,
        hdsl2ShdslSpanConfProfileTable, MUST be rejected."
     ::= { hdsl2ShdslSpanConfEntry 2 }

   hdsl2ShdslSpanConfAlarmProfile OBJECT-TYPE
      SYNTAX       SnmpAdminString (SIZE(1..32))
      MAX-ACCESS   read-write
      STATUS       current
      DESCRIPTION
        "This object is a pointer to an Alarm configuration profile in
         the hdsl2ShdslEndpointAlarmConfProfileTable.  The value of
         this object is the index of the referenced profile in the
         hdsl2ShdslEndpointAlarmConfProfileTable.  The alarm
         threshold configuration in the referenced profile will be
         used by default for all segment endpoints in this span.
         Individual endpoints may override this profile by explicitly
         specifying some other profile in the
         hdsl2ShdslEndpointConfTable.  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,
        hdsl2ShdslEndpointAlarmConfProfileTable, MUST be rejected."
     ::= { hdsl2ShdslSpanConfEntry 3 }

   -- Span Status Group
   --

   hdsl2ShdslSpanStatusTable OBJECT-TYPE
      SYNTAX       SEQUENCE OF Hdsl2ShdslSpanStatusEntry
      MAX-ACCESS not-accessible
      STATUS       current
      DESCRIPTION
        "This table provides overall status information of
         HDSL2/SHDSL spans.  This table contains live data from
         equipment.  As such, it is NOT persistent."
     ::= { hdsl2ShdslMibObjects 2 }

   hdsl2ShdslSpanStatusEntry OBJECT-TYPE
      SYNTAX       Hdsl2ShdslSpanStatusEntry
      MAX-ACCESS  not-accessible
      STATUS       current
      DESCRIPTION
```

      "An entry in the hdsl2ShdslSpanStatusTable. 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 }
    ::= { hdsl2ShdslSpanStatusTable 1 }

 Hdsl2ShdslSpanStatusEntry ::=
    SEQUENCE
    {
    hdsl2ShdslStatusNumAvailRepeaters   Unsigned32,
    hdsl2ShdslStatusMaxAttainableLineRate   Unsigned32,
    hdsl2ShdslStatusActualLineRate   Unsigned32,
    hdsl2ShdslStatusTransmissionModeCurrent
                        Hdsl2ShdslTransmissionModeType,
    hdsl2ShdslStatusMaxAttainablePayloadRate Unsigned32,
    hdsl2ShdslStatusActualPayloadRate   Unsigned32
    }

 hdsl2ShdslStatusNumAvailRepeaters OBJECT-TYPE
    SYNTAX   Unsigned32(0..8)
    MAX-ACCESS read-only
    STATUS   current
    DESCRIPTION
      "Contains the actual number of repeaters/regenerators
       discovered in this HDSL2/SHDSL span."
    ::= { hdsl2ShdslSpanStatusEntry 1 }

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

 hdsl2ShdslStatusActualLineRate OBJECT-TYPE
    SYNTAX   Unsigned32(0..4294967295)
    UNITS   "bps"
    MAX-ACCESS read-only
    STATUS   current
    DESCRIPTION
      "Contains the actual line rate in this HDSL2/SHDSL span. This

```
      SHOULD equal ifSpeed.  This rate includes payload (user data)
      and any applicable framing overhead"
   ::= { hdsl2ShdslSpanStatusEntry 3 }

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

hdsl2ShdslStatusMaxAttainablePayloadRate OBJECT-TYPE
   SYNTAX      Unsigned32(0..4294967295)
   UNITS       "bps"
   MAX-ACCESS  read-only
   STATUS      current
   DESCRIPTION
     "Contains the maximum attainable payload (user data)
      line rate in this HDSL2/SHDSL span.  This object provides
      the maximum rate the line is capable of achieving.  This
      is based upon measurements made during line probing.  Any
      framing overhead is not included."
   ::= { hdsl2ShdslSpanStatusEntry 5 }

hdsl2ShdslStatusActualPayloadRate OBJECT-TYPE
   SYNTAX      Unsigned32(0..4294967295)
   UNITS       "bps"
   MAX-ACCESS  read-only
   STATUS      current
   DESCRIPTION
     "Contains the actual line rate in this HDSL2/SHDSL span.  Any
      framing overhead is not included."
   ::= { hdsl2ShdslSpanStatusEntry 6 }

-- Unit Inventory Group
--

hdsl2ShdslInventoryTable OBJECT-TYPE
   SYNTAX      SEQUENCE OF Hdsl2ShdslInventoryEntry
   MAX-ACCESS not-accessible
   STATUS      current
   DESCRIPTION
     "This table supports retrieval of unit inventory information
      available via the EOC from units in 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."
    ::= { hdsl2ShdslMibObjects 3 }

    hdsl2ShdslInventoryEntry OBJECT-TYPE
        SYNTAX   Hdsl2ShdslInventoryEntry
        MAX-ACCESS not-accessible
        STATUS   current
        DESCRIPTION
          "An entry in the hdsl2ShdslInventoryTable. Each entry
           represents inventory information for a single unit in a
           HDSL2/SHDSL line. It is indexed by the ifIndex of the
           HDSL2/SHDSL line and the Hdsl2ShdslUnitId of the
           associated unit."
        INDEX { ifIndex, hdsl2ShdslInvIndex }
        ::= { hdsl2ShdslInventoryTable 1 }

    Hdsl2ShdslInventoryEntry ::=
        SEQUENCE
        {
        hdsl2ShdslInvIndex   Hdsl2ShdslUnitId,
        hdsl2ShdslInvVendorID   OCTET STRING,
        hdsl2ShdslInvVendorModelNumber   OCTET STRING,
        hdsl2ShdslInvVendorSerialNumber   OCTET STRING,
        hdsl2ShdslInvVendorEOCSoftwareVersion   Integer32,
        hdsl2ShdslInvStandardVersion   Integer32,
        hdsl2ShdslInvVendorListNumber   OCTET STRING,
        hdsl2ShdslInvVendorIssueNumber   OCTET STRING,
        hdsl2ShdslInvVendorSoftwareVersion   OCTET STRING,
        hdsl2ShdslInvEquipmentCode   OCTET STRING,
        hdsl2ShdslInvVendorOther   OCTET STRING,
        hdsl2ShdslInvTransmissionModeCapability
                            Hdsl2ShdslTransmissionModeType
        }

    hdsl2ShdslInvIndex OBJECT-TYPE
        SYNTAX   Hdsl2ShdslUnitId
        MAX-ACCESS not-accessible
        STATUS   current

      DESCRIPTION
        "Each entry in this table corresponds to a physical element
         in a HDSL2/SHDSL Span. It is based on the EOC unit addressing
         scheme with reference to the xtuC."
      ::= { hdsl2ShdslInventoryEntry 1 }

   hdsl2ShdslInvVendorID OBJECT-TYPE
      SYNTAX   OCTET STRING(SIZE(8))
      MAX-ACCESS read-only
      STATUS   current
      DESCRIPTION
        "Vendor ID as reported in an Inventory Response message."
      REFERENCE
        "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID
         130, Octets 25-32."
      ::= { hdsl2ShdslInventoryEntry 2 }

   hdsl2ShdslInvVendorModelNumber OBJECT-TYPE
      SYNTAX   OCTET STRING(SIZE(12))
      MAX-ACCESS read-only
      STATUS   current
      DESCRIPTION
        "Vendor model number as reported in an Inventory Response
         message."
      REFERENCE
        "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID
         130, Octets 33-44."
      ::= { hdsl2ShdslInventoryEntry 3 }

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

   hdsl2ShdslInvVendorEOCSoftwareVersion OBJECT-TYPE
      SYNTAX   Integer32
      MAX-ACCESS read-only
      STATUS   current
      DESCRIPTION
        "Vendor EOC version as reported in a Discovery Response
         message."

         REFERENCE
           "G.991.2, Section 9.5.5.7.2, Discovery response - Message ID
            130, Octet 12."
         ::= { hdsl2ShdslInventoryEntry 5 }

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

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

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

     hdsl2ShdslInvVendorSoftwareVersion OBJECT-TYPE
         SYNTAX   OCTET STRING(SIZE(6))
         MAX-ACCESS   read-only
         STATUS   current
         DESCRIPTION
           "Vendor software version as reported in an Inventory Response
            message."

```
      REFERENCE
        "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID
         130, Octets 8-13."
      ::= { hdsl2ShdslInventoryEntry 9 }

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

   hdsl2ShdslInvVendorOther OBJECT-TYPE
      SYNTAX      OCTET STRING(SIZE(12))
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "Other vendor information as reported in an Inventory Response
         message."
      REFERENCE
        "G.991.2, Section 9.5.5.7.4, Inventory response - Message ID
         130, Octets 57-68."
      ::= { hdsl2ShdslInventoryEntry 11 }

   hdsl2ShdslInvTransmissionModeCapability 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
   --

   hdsl2ShdslEndpointConfTable 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 }


  hdsl2ShdslEndpointConfEntry 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
     }


  hdsl2ShdslEndpointSide 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 }


  hdsl2ShdslEndpointWirePair 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 }


  hdsl2ShdslEndpointAlarmConfProfile OBJECT-TYPE
     SYNTAX       SnmpAdminString (SIZE(0..32))
     MAX-ACCESS   read-write
     STATUS       current
     DESCRIPTION
```

```
         "This object configures the alarm threshold values to be used
          for this segment endpoint.  The values are obtained from the
          alarm configuration profile referenced by this object.  The
          value of this object is the index of the referenced profile in
          the hdsl2ShdslEndpointAlarmConfProfileTable, or NULL (a
          zero-length SnmpAdminString).  If the value is a zero-length
          SnmpAdminString, the endpoint uses the default Alarm
          Configuration Profile for the associated span as per the
          hdsl2ShdslSpanConfAlarmProfile object in the
          hdsl2ShdslSpanConfTable.  The default value of this object is
          a zero-length SnmpAdminString.

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

   -- Segment Endpoint Current Status/Performance Group
   --

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

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

   Hdsl2ShdslEndpointCurrEntry ::=
       SEQUENCE
       {
```

```
    hdsl2ShdslEndpointCurrAtn                 Integer32,
    hdsl2ShdslEndpointCurrSnrMgn              Integer32,
    hdsl2ShdslEndpointCurrStatus              BITS,
    hdsl2ShdslEndpointES                      Counter32,
    hdsl2ShdslEndpointSES                     Counter32,
    hdsl2ShdslEndpointCRCanomalies            Counter32,
    hdsl2ShdslEndpointLOSWS                   Counter32,
    hdsl2ShdslEndpointUAS                     Counter32,
    hdsl2ShdslEndpointCurr15MinTimeElapsed
                            Hdsl2ShdslPerfTimeElapsed,
    hdsl2ShdslEndpointCurr15MinES             PerfCurrentCount,
    hdsl2ShdslEndpointCurr15MinSES            PerfCurrentCount,
    hdsl2ShdslEndpointCurr15MinCRCanomalies   PerfCurrentCount,
    hdsl2ShdslEndpointCurr15MinLOSWS          PerfCurrentCount,
    hdsl2ShdslEndpointCurr15MinUAS            PerfCurrentCount,
    hdsl2ShdslEndpointCurr1DayTimeElapsed
                               Hdsl2ShdslPerfTimeElapsed,
    hdsl2ShdslEndpointCurr1DayES
                               Hdsl2ShdslPerfCurrDayCount,
    hdsl2ShdslEndpointCurr1DaySES
                               Hdsl2ShdslPerfCurrDayCount,
    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 module."
   REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
   ::= { hdsl2ShdslEndpointCurrEntry 3 }

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

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

hdsl2ShdslEndpointCRCanomalies OBJECT-TYPE
   SYNTAX   Counter32
   UNITS   "detected CRC Anomalies"
   MAX-ACCESS   read-only

```
   STATUS        current
   DESCRIPTION
     "Count of CRC anomalies on this endpoint since the xU was
      last restarted."
   REFERENCE    "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
   ::= { hdsl2ShdslEndpointCurrEntry 6 }

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

hdsl2ShdslEndpointUAS OBJECT-TYPE
   SYNTAX        Counter32
   UNITS         "seconds"
   MAX-ACCESS    read-only
   STATUS        current
   DESCRIPTION
     "Count of Unavailable Seconds (UAS) on this endpoint since
      the xU was last restarted."
   REFERENCE    "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
   ::= { hdsl2ShdslEndpointCurrEntry 8 }

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

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

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

    hdsl2ShdslEndpointCurr15MinCRCanomalies OBJECT-TYPE
       SYNTAX   PerfCurrentCount
       UNITS   "detected CRC Anomalies"
       MAX-ACCESS   read-only
       STATUS   current
       DESCRIPTION
         "Count of CRC anomalies in the current 15-minute interval."
       REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
       ::= { hdsl2ShdslEndpointCurrEntry 12 }

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

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

    hdsl2ShdslEndpointCurr1DayTimeElapsed OBJECT-TYPE
       SYNTAX   Hdsl2ShdslPerfTimeElapsed
       UNITS   "seconds"
       MAX-ACCESS   read-only
       STATUS   current

          DESCRIPTION
            "Number of seconds that have elapsed since the beginning of
             the current 1-day interval."
          ::= { hdsl2ShdslEndpointCurrEntry 15 }

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

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

      hdsl2ShdslEndpointCurr1DayCRCanomalies OBJECT-TYPE
          SYNTAX   Hdsl2ShdslPerfCurrDayCount
          UNITS   "detected CRC Anomalies"
          MAX-ACCESS   read-only
          STATUS   current
          DESCRIPTION
            "Count of CRC anomalies during the current day as measured
             by hdsl2ShdslEndpointCurr1DayTimeElapsed."
          REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
          ::= { hdsl2ShdslEndpointCurrEntry 18 }

      hdsl2ShdslEndpointCurr1DayLOSWS OBJECT-TYPE
          SYNTAX   Hdsl2ShdslPerfCurrDayCount
          UNITS   "seconds"
          MAX-ACCESS   read-only
          STATUS   current
          DESCRIPTION
            "Count of Loss of Sync Word (LOSW) Seconds during the current
             day as measured by hdsl2ShdslEndpointCurr1DayTimeElapsed."
          REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
          ::= { hdsl2ShdslEndpointCurrEntry 19 }

    hdsl2ShdslEndpointCurr1DayUAS OBJECT-TYPE
       SYNTAX   Hdsl2ShdslPerfCurrDayCount
       UNITS   "seconds"
       MAX-ACCESS   read-only
       STATUS   current
       DESCRIPTION
         "Count of Unavailable Seconds (UAS) during the current day as
          measured by hdsl2ShdslEndpointCurr1DayTimeElapsed."
       REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
       ::= { hdsl2ShdslEndpointCurrEntry 20 }

    hdsl2ShdslEndpointCurrTipRingReversal OBJECT-TYPE
       SYNTAX   INTEGER
                     {
                     normal(1),
                     reversed(2)
                     }
       MAX-ACCESS   read-only
       STATUS   current
       DESCRIPTION
         "This object indicates the state of the tip/ring for the
          wire pair."
       ::= { hdsl2ShdslEndpointCurrEntry 21 }

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

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

    hdsl2Shdsl15MinIntervalTable OBJECT-TYPE
       SYNTAX   SEQUENCE OF Hdsl2Shdsl15MinIntervalEntry
       MAX-ACCESS   not-accessible
       STATUS   current
       DESCRIPTION
         "This table provides one row for each HDSL2/SHDSL endpoint

```
      performance data collection interval.  This table contains
      live data from equipment.  As such, it is NOT persistent."
   ::= { hdsl2ShdslMibObjects 6 }

hdsl2Shdsl15MinIntervalEntry OBJECT-TYPE
   SYNTAX      Hdsl2Shdsl15MinIntervalEntry
   MAX-ACCESS  not-accessible
   STATUS      current
   DESCRIPTION
     "An entry in the hdsl2Shdsl15MinIntervalTable."
   INDEX { ifIndex, hdsl2ShdslInvIndex, hdsl2ShdslEndpointSide,
           hdsl2ShdslEndpointWirePair, hdsl2Shdsl15MinIntervalNumber}
   ::= { hdsl2Shdsl15MinIntervalTable 1 }

Hdsl2Shdsl15MinIntervalEntry ::=
   SEQUENCE
   {
   hdsl2Shdsl15MinIntervalNumber       Unsigned32,
   hdsl2Shdsl15MinIntervalES           PerfIntervalCount,
   hdsl2Shdsl15MinIntervalSES          PerfIntervalCount,
   hdsl2Shdsl15MinIntervalCRCanomalies PerfIntervalCount,
   hdsl2Shdsl15MinIntervalLOSWS        PerfIntervalCount,
   hdsl2Shdsl15MinIntervalUAS          PerfIntervalCount
   }

hdsl2Shdsl15MinIntervalNumber 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."
   ::= { hdsl2Shdsl15MinIntervalEntry 1 }

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

hdsl2Shdsl15MinIntervalSES OBJECT-TYPE
   SYNTAX      PerfIntervalCount
   UNITS       "seconds"
```

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

   hdsl2Shdsl15MinIntervalCRCanomalies OBJECT-TYPE
      SYNTAX      PerfIntervalCount
      UNITS       "detected CRC Anomalies"
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "Count of CRC anomalies during the interval."
      REFERENCE   "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
      ::= { hdsl2Shdsl15MinIntervalEntry 4 }

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

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

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

   hdsl2Shdsl1DayIntervalTable OBJECT-TYPE
      SYNTAX      SEQUENCE OF Hdsl2Shdsl1DayIntervalEntry
      MAX-ACCESS  not-accessible
      STATUS      current
      DESCRIPTION
        "This table provides one row for each HDSL2/SHDSL endpoint
         performance data collection interval.  This table contains
```

```
      live data from equipment.  As such, it is NOT persistent."
   ::= { hdsl2ShdslMibObjects 7 }

hdsl2Shdsl1DayIntervalEntry OBJECT-TYPE
   SYNTAX       Hdsl2Shdsl1DayIntervalEntry
   MAX-ACCESS   not-accessible
   STATUS       current
   DESCRIPTION
     "An entry in the hdsl2Shdsl1DayIntervalTable."
   INDEX { ifIndex, hdsl2ShdslInvIndex, hdsl2ShdslEndpointSide,
           hdsl2ShdslEndpointWirePair, hdsl2Shdsl1DayIntervalNumber }
   ::= { hdsl2Shdsl1DayIntervalTable 1 }

Hdsl2Shdsl1DayIntervalEntry ::=
   SEQUENCE
   {
   hdsl2Shdsl1DayIntervalNumber        Unsigned32,
   hdsl2Shdsl1DayIntervalMoniSecs      Hdsl2ShdslPerfTimeElapsed,
   hdsl2Shdsl1DayIntervalES            Hdsl2Shdsl1DayIntervalCount,
   hdsl2Shdsl1DayIntervalSES           Hdsl2Shdsl1DayIntervalCount,
   hdsl2Shdsl1DayIntervalCRCanomalies  Hdsl2Shdsl1DayIntervalCount,
   hdsl2Shdsl1DayIntervalLOSWS         Hdsl2Shdsl1DayIntervalCount,
   hdsl2Shdsl1DayIntervalUAS           Hdsl2Shdsl1DayIntervalCount
   }

hdsl2Shdsl1DayIntervalNumber 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."
   ::= { hdsl2Shdsl1DayIntervalEntry 1 }

hdsl2Shdsl1DayIntervalMoniSecs OBJECT-TYPE
   SYNTAX       Hdsl2ShdslPerfTimeElapsed
   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."
   ::= { hdsl2Shdsl1DayIntervalEntry 2 }
```

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

   hdsl2Shdsl1DayIntervalSES OBJECT-TYPE
      SYNTAX       Hdsl2Shdsl1DayIntervalCount
      UNITS        "seconds"
      MAX-ACCESS   read-only
      STATUS       current
      DESCRIPTION
        "Count of Severely Errored Seconds (SES) during the 1-day
         interval as measured by hdsl2Shdsl1DayIntervalMoniSecs."
      REFERENCE    "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
      ::= { hdsl2Shdsl1DayIntervalEntry 4 }

   hdsl2Shdsl1DayIntervalCRCanomalies OBJECT-TYPE
      SYNTAX       Hdsl2Shdsl1DayIntervalCount
      UNITS        "detected CRC Anomalies"
      MAX-ACCESS   read-only
      STATUS       current
      DESCRIPTION
        "Count of CRC anomalies during the 1-day interval as
         measured by hdsl2Shdsl1DayIntervalMoniSecs."
      REFERENCE    "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
      ::= { hdsl2Shdsl1DayIntervalEntry 5 }

   hdsl2Shdsl1DayIntervalLOSWS OBJECT-TYPE
      SYNTAX       Hdsl2Shdsl1DayIntervalCount
      UNITS        "seconds"
      MAX-ACCESS   read-only
      STATUS       current
      DESCRIPTION
        "Count of Loss of Sync Word (LOSW) Seconds during the 1-day
         interval as measured by hdsl2Shdsl1DayIntervalMoniSecs."
      REFERENCE    "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
      ::= { hdsl2Shdsl1DayIntervalEntry 6 }

   hdsl2Shdsl1DayIntervalUAS OBJECT-TYPE
      SYNTAX       Hdsl2Shdsl1DayIntervalCount
      UNITS        "seconds"
      MAX-ACCESS   read-only
```

```
     STATUS       current
     DESCRIPTION
       "Count of Unavailable Seconds (UAS) during the 1-day interval
        as measured by hdsl2Shdsl1DayIntervalMoniSecs."
     REFERENCE    "HDSL2 Section 7.5.3.7; SHDSL Section 9.5.5.7"
     ::= { hdsl2Shdsl1DayIntervalEntry 7 }

  -- Maintenance Group
  --

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

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

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

  hdsl2ShdslMaintLoopbackConfig OBJECT-TYPE
     SYNTAX       INTEGER
                  {
                  noLoopback(1),
                  normalLoopback(2),
                  specialLoopback(3)
```

```
                     }
          MAX-ACCESS  read-write
          STATUS      current
          DESCRIPTION
            "This object controls configuration of loopbacks for the
             associated segment endpoint.  The status of the loopback
             is obtained via the hdsl2ShdslEndpointCurrStatus object."
          ::= { hdsl2ShdslEndpointMaintEntry 1 }

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

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

      hdsl2ShdslMaintSoftRestart OBJECT-TYPE
          SYNTAX      INTEGER
                      {
                      ready(1),
                      restart(2)
                      }
          MAX-ACCESS  read-write
          STATUS      current
          DESCRIPTION
            "This object enables the manager to trigger a soft restart
             of the modem at the associated segment endpoint.  The
             manager may only set this object to the 'restart(2)'
```

```
     value, which initiates a restart.  The agent will perform a
     restart after approximately 5 seconds.  Following the 5 second
     period, the agent will restore the object to the 'ready(1)'
     state."
  ::= { hdsl2ShdslEndpointMaintEntry 4 }

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

hdsl2ShdslUnitMaintEntry OBJECT-TYPE
  SYNTAX       Hdsl2ShdslUnitMaintEntry
  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,
       hdsl2ShdslSpanConfWorstCaseTargetMarginDown Integer32,
       hdsl2ShdslSpanConfCurrCondTargetMarginUp    Integer32,
       hdsl2ShdslSpanConfWorstCaseTargetMarginUp   Integer32,
       hdsl2ShdslSpanConfUsedTargetMargins         BITS,
       hdsl2ShdslSpanConfReferenceClock
                              Hdsl2ShdslClockReferenceType,
       hdsl2ShdslSpanConfLineProbeEnable             INTEGER,
       hdsl2ShdslSpanConfProfileRowStatus        RowStatus
       }

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

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

   hdsl2ShdslSpanConfMinLineRate OBJECT-TYPE
      SYNTAX      Unsigned32(0..4294967295)
      UNITS       "bps"
      MAX-ACCESS  read-create
      STATUS      current
```

      DESCRIPTION
        "This object configures the minimum transmission rate for
         the associated SHDSL Line in bits-per-second (bps) and includes
         both payload (user data) and any applicable framing overhead.
         If the minimum line rate equals the maximum line rate
         (hdsl2ShdslSpanMaxLineRate), the line rate is considered
         'fixed'. If the minimum line rate is less than the
         maximum line rate, the line rate is considered
         'rate-adaptive'."
      DEFVAL   { 1552000 }
      ::= { hdsl2ShdslSpanConfProfileEntry 3 }

   hdsl2ShdslSpanConfMaxLineRate OBJECT-TYPE
      SYNTAX   Unsigned32(0..4294967295)
      UNITS   "bps"
      MAX-ACCESS   read-create
      STATUS   current
      DESCRIPTION
        "This object configures the maximum transmission rate for
         the associated SHDSL Line in bits-per-second (bps) and includes
         both payload (user data) and any applicable framing overhead.
         If the minimum line rate equals the maximum line rate
         (hdsl2ShdslSpanMaxLineRate), the line rate is considered
         'fixed'. If the minimum line rate is less than the
         maximum line rate, the line rate is considered
         'rate-adaptive'."
      DEFVAL   { 1552000 }
      ::= { hdsl2ShdslSpanConfProfileEntry 4 }

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

   hdsl2ShdslSpanConfTransmissionMode OBJECT-TYPE
      SYNTAX   Hdsl2ShdslTransmissionModeType
      MAX-ACCESS   read-create

```
      STATUS      current
      DESCRIPTION
        "This object specifies the regional setting for the SHDSL
         line."
      DEFVAL      { { region1 } }
      ::= { hdsl2ShdslSpanConfProfileEntry 6 }

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

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

   hdsl2ShdslSpanConfCurrCondTargetMarginDown OBJECT-TYPE
      SYNTAX      Integer32(-10..21)
      UNITS       "dB"
      MAX-ACCESS  read-create
      STATUS      current
      DESCRIPTION
        "This object specifies the downstream current condition target
         SNR margin for 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 9 }
```

    hdsl2ShdslSpanConfWorstCaseTargetMarginDown OBJECT-TYPE
       SYNTAX   Integer32(-10..21)
       UNITS   "dB"
       MAX-ACCESS   read-create
       STATUS   current
       DESCRIPTION
         "This object specifies the downstream worst case target SNR
          margin for 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 }

    hdsl2ShdslSpanConfCurrCondTargetMarginUp OBJECT-TYPE
       SYNTAX   Integer32(-10..21)
       UNITS   "dB"
       MAX-ACCESS   read-create
       STATUS   current
       DESCRIPTION
         "This object specifies the upstream current condition target
          SNR margin for 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 }

    hdsl2ShdslSpanConfWorstCaseTargetMarginUp OBJECT-TYPE
       SYNTAX   Integer32(-10..21)
       UNITS   "dB"
       MAX-ACCESS   read-create
       STATUS   current
       DESCRIPTION
         "This object specifies the upstream worst case target SNR
          margin for 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 }

    hdsl2ShdslSpanConfUsedTargetMargins OBJECT-TYPE
       SYNTAX   BITS
                    {
                    currCondDown(0),
                    worstCaseDown(1),
                    currCondUp(2),
                    worstCaseUp(3)
                    }
       MAX-ACCESS   read-create

```
      STATUS      current
      DESCRIPTION
        "Indicates whether a target SNR margin is enabled or
         disabled.  This is a bit-map of possible settings.  The
         various bit positions are:

         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 hdsl2ShdslSpanConfProfile, the
        entry MUST remain active until all references are removed."
     ::= { hdsl2ShdslSpanConfProfileEntry 16 }

  -- Segment Endpoint Alarm Configuration Profile group
  --

  hdsl2ShdslEndpointAlarmConfProfileTable OBJECT-TYPE
     SYNTAX      SEQUENCE OF Hdsl2ShdslEndpointAlarmConfProfileEntry
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
       "This table supports definitions of alarm configuration
        profiles for HDSL2/SHDSL segment endpoints.  This table
        MUST be maintained in a persistent manner."
     ::= { hdsl2ShdslMibObjects 11 }

  hdsl2ShdslEndpointAlarmConfProfileEntry OBJECT-TYPE
     SYNTAX      Hdsl2ShdslEndpointAlarmConfProfileEntry
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
       "Each entry corresponds to a single alarm configuration profile.
        Each profile contains a set of parameters for setting alarm
        thresholds for various performance attributes monitored at
        HDSL2/SHDSL segment endpoints.  Profiles may be created/deleted
        using the row creation/deletion mechanism via
        hdsl2ShdslEndpointAlarmConfProfileRowStatus.  If an active
        entry is referenced in either hdsl2ShdslSpanConfAlarmProfile
        or hdsl2ShdslEndpointAlarmConfProfile, the entry MUST remain
        active until all references are removed."
     INDEX { IMPLIED hdsl2ShdslEndpointAlarmConfProfileName }
     ::= { hdsl2ShdslEndpointAlarmConfProfileTable 1 }

  Hdsl2ShdslEndpointAlarmConfProfileEntry ::=
     SEQUENCE
     {
     hdsl2ShdslEndpointAlarmConfProfileName        SnmpAdminString,
     hdsl2ShdslEndpointThreshLoopAttenuation       Integer32,
     hdsl2ShdslEndpointThreshSNRMargin             Integer32,
     hdsl2ShdslEndpointThreshES
                                  Hdsl2ShdslPerfIntervalThreshold,
```

```
    hdsl2ShdslEndpointThreshSES
                                Hdsl2ShdslPerfIntervalThreshold,
    hdsl2ShdslEndpointThreshCRCanomalies       Integer32,
    hdsl2ShdslEndpointThreshLOSWS
                                Hdsl2ShdslPerfIntervalThreshold,
    hdsl2ShdslEndpointThreshUAS
                                Hdsl2ShdslPerfIntervalThreshold,
    hdsl2ShdslEndpointAlarmConfProfileRowStatus  RowStatus
    }

hdsl2ShdslEndpointAlarmConfProfileName OBJECT-TYPE
    SYNTAX      SnmpAdminString (SIZE(1..32))
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
      "This object is the unique index associated with this profile."
    ::= { hdsl2ShdslEndpointAlarmConfProfileEntry 1 }

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

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

hdsl2ShdslEndpointThreshES OBJECT-TYPE
    SYNTAX      Hdsl2ShdslPerfIntervalThreshold
    UNITS       "seconds"
    MAX-ACCESS  read-create
```

```
      STATUS       current
      DESCRIPTION
        "This object configures the threshold for the number of
         errored seconds (ES) within any given 15-minute performance
         data collection interval.  If the value of errored seconds
         in a particular 15-minute collection interval reaches/
         exceeds this value, a hdsl2ShdslPerfESThresh MAY be
         generated.  At most one notification will be sent per
         interval per endpoint."
      DEFVAL       { 0 }
      ::= { hdsl2ShdslEndpointAlarmConfProfileEntry 4 }

   hdsl2ShdslEndpointThreshSES OBJECT-TYPE
      SYNTAX       Hdsl2ShdslPerfIntervalThreshold
      UNITS        "seconds"
      MAX-ACCESS   read-create
      STATUS       current
      DESCRIPTION
        "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 hdsl2ShdslPerfSESThresh
         MAY be generated.  At most one notification will be sent per
         interval per endpoint."
      DEFVAL       { 0 }
      ::= { hdsl2ShdslEndpointAlarmConfProfileEntry 5 }

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

   hdsl2ShdslEndpointThreshLOSWS OBJECT-TYPE
      SYNTAX       Hdsl2ShdslPerfIntervalThreshold
      UNITS        "seconds"
      MAX-ACCESS   read-create
```

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

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

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

   -- Notifications Group
   --

   hdsl2ShdslNotifications OBJECT IDENTIFIER ::= { hdsl2ShdslMIB 0 }

   hdsl2ShdslLoopAttenCrossing NOTIFICATION-TYPE
      OBJECTS

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

   hdsl2ShdslSNRMarginCrossing NOTIFICATION-TYPE
      OBJECTS
      {
      hdsl2ShdslEndpointCurrSnrMgn,
      hdsl2ShdslEndpointThreshSNRMargin
      }
      STATUS     current
      DESCRIPTION
        "This notification indicates that the SNR margin threshold (as
         per the hdsl2ShdslEndpointThreshSNRMargin value) has been
         reached/exceeded for the HDSL2/SHDSL segment endpoint."
      ::= { hdsl2ShdslNotifications 2 }

   hdsl2ShdslPerfESThresh NOTIFICATION-TYPE
      OBJECTS
      {
      hdsl2ShdslEndpointCurr15MinES,
      hdsl2ShdslEndpointThreshES
      }
      STATUS     current
      DESCRIPTION
        "This notification indicates that the errored seconds
         threshold (as per the hdsl2ShdslEndpointThreshES value)
         has been reached/exceeded for the HDSL2/SHDSL segment
         endpoint."
      ::= { hdsl2ShdslNotifications 3 }

   hdsl2ShdslPerfSESThresh NOTIFICATION-TYPE
      OBJECTS
      {
      hdsl2ShdslEndpointCurr15MinSES,
      hdsl2ShdslEndpointThreshSES
      }
      STATUS     current
      DESCRIPTION
        "This notification indicates that the severely errored seconds
```

```
         threshold (as per the hdsl2ShdslEndpointThreshSES value) has
         been reached/exceeded for the HDSL2/SHDSL Segment Endpoint."
      ::= { hdsl2ShdslNotifications 4 }


   hdsl2ShdslPerfCRCanomaliesThresh NOTIFICATION-TYPE
      OBJECTS
      {
      hdsl2ShdslEndpointCurr15MinCRCanomalies,
      hdsl2ShdslEndpointThreshCRCanomalies
      }
      STATUS     current
      DESCRIPTION
        "This notification indicates that the CRC anomalies threshold
         (as per the hdsl2ShdslEndpointThreshCRCanomalies value) has
         been reached/exceeded for the HDSL2/SHDSL Segment Endpoint."
      ::= { hdsl2ShdslNotifications 5 }


   hdsl2ShdslPerfLOSWSThresh NOTIFICATION-TYPE
      OBJECTS
      {
      hdsl2ShdslEndpointCurr15MinLOSWS,
      hdsl2ShdslEndpointThreshLOSWS
      }
      STATUS      current
      DESCRIPTION
        "This notification indicates that the LOSW seconds threshold
         (as per the hdsl2ShdslEndpointThreshLOSWS value) has been
         reached/exceeded for the HDSL2/SHDSL segment endpoint."
      ::= { hdsl2ShdslNotifications 6 }


   hdsl2ShdslPerfUASThresh NOTIFICATION-TYPE
      OBJECTS
      {
      hdsl2ShdslEndpointCurr15MinUAS,
      hdsl2ShdslEndpointThreshUAS
      }
      STATUS     current
      DESCRIPTION
        "This notification indicates that the unavailable seconds
         threshold (as per the hdsl2ShdslEndpointThreshUAS value) has
         been reached/exceeded for the HDSL2/SHDSL segment endpoint."
      ::= { hdsl2ShdslNotifications 7 }


   hdsl2ShdslSpanInvalidNumRepeaters NOTIFICATION-TYPE
      OBJECTS
      {
      hdsl2ShdslSpanConfNumRepeaters
      }
```

```
      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 }

   hdsl2ShdslLoopbackFailure NOTIFICATION-TYPE
      OBJECTS
      {
      hdsl2ShdslMaintLoopbackConfig
      }
      STATUS      current
      DESCRIPTION
        "This notification indicates that an endpoint maintenance
         loopback command failed for an HDSL2/SHDSL segment."
      ::= { hdsl2ShdslNotifications 9 }

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

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

   hdsl2ShdsldcContinuityFault NOTIFICATION-TYPE
      OBJECTS
      {
      hdsl2ShdslEndpointCurrStatus
```

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

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

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

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

   hdsl2ShdslLocalPowerLoss NOTIFICATION-TYPE
      OBJECTS
      {
      hdsl2ShdslInvVendorID
```

```
      }
      STATUS    current
      DESCRIPTION
        "This notification indicates impending unit failure due to
         loss of local power (last gasp)."
      ::= { hdsl2ShdslNotifications 16 }

   -- conformance information
   --

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

   -- agent compliance statements

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

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

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

   GROUP   hdsl2ShdslSpanShdslStatusGroup
      DESCRIPTION
```

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

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

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

   OBJECT hdsl2ShdslStatusMaxAttainableLineRate
      SYNTAX   Unsigned32(0..4112000)
      DESCRIPTION
         "An implementation only has to support the range as
         applicable for the original g.shdsl specification defined
         in RFC 3276."

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

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

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

      ::= { hdsl2ShdslCompliances 1 }

     hdsl2GshdslbisLineMibCompliance MODULE-COMPLIANCE
        STATUS   current
        DESCRIPTION
          "The compliance statement for SNMP entities which implement
           HDSL2 and SHDSL. The version of SHDSL supported in this
           compliance statement is g.shdsl.bis."
        MODULE
        MANDATORY-GROUPS
        {
        hdsl2ShdslSpanConfGroup,
        hdsl2ShdslSpanStatusGroup,
        hdsl2ShdslInventoryGroup,
        hdsl2ShdslEndpointConfGroup,
        hdsl2ShdslEndpointCurrGroup,
        hdsl2Shdsl15MinIntervalGroup,
        hdsl2Shdsl1DayIntervalGroup,
        hdsl2ShdslMaintenanceGroup,
        hdsl2ShdslEndpointAlarmConfGroup,
        hdsl2ShdslNotificationGroup
        }

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

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

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

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

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

        ::= { hdsl2ShdslCompliances 2 }

```
    -- units of conformance
    --

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

    hdsl2ShdslSpanStatusGroup OBJECT-GROUP
       OBJECTS
       {
       hdsl2ShdslStatusNumAvailRepeaters
       }
       STATUS       current
       DESCRIPTION
         "This group supports objects for retrieving span related
          status for HDSL2/SHDSL lines."
       ::= { hdsl2ShdslGroups 2 }

    hdsl2ShdslInventoryShdslGroup OBJECT-GROUP
       OBJECTS
       {
       hdsl2ShdslInvTransmissionModeCapability
       }
       STATUS       current
       DESCRIPTION
         "This group supports objects for retrieving SHDSL-specific
          inventory information."
       ::= { hdsl2ShdslGroups 3 }

    hdsl2ShdslSpanShdslStatusGroup OBJECT-GROUP
       OBJECTS
       {
       hdsl2ShdslStatusMaxAttainableLineRate,
       hdsl2ShdslStatusActualLineRate,
       hdsl2ShdslStatusTransmissionModeCurrent
       }
       STATUS       current
       DESCRIPTION
         "This group supports objects for retrieving SHDSL-specific
```

```
      span related status."
   ::= { hdsl2ShdslGroups 4 }


hdsl2ShdslInventoryGroup OBJECT-GROUP
   OBJECTS
   {
   hdsl2ShdslInvVendorID,
   hdsl2ShdslInvVendorModelNumber,
   hdsl2ShdslInvVendorSerialNumber,
   hdsl2ShdslInvVendorEOCSoftwareVersion,
   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 }


hdsl2ShdslEndpointConfGroup OBJECT-GROUP
   OBJECTS
   {
   hdsl2ShdslEndpointCurrAtn
   }
   STATUS      current
   DESCRIPTION
     "This group supports objects for configuring parameters for
      segment endpoints in HDSL2/SHDSL lines."
   ::= { hdsl2ShdslGroups 6 }


hdsl2ShdslEndpointCurrGroup OBJECT-GROUP
   OBJECTS
   {
   hdsl2ShdslEndpointCurrAtn,
   hdsl2ShdslEndpointCurrSnrMgn,
   hdsl2ShdslEndpointCurrStatus,
   hdsl2ShdslEndpointES,
   hdsl2ShdslEndpointSES,
   hdsl2ShdslEndpointCRCanomalies,
   hdsl2ShdslEndpointLOSWS,
   hdsl2ShdslEndpointUAS,
   hdsl2ShdslEndpointCurr15MinTimeElapsed,
   hdsl2ShdslEndpointCurr15MinES,
   hdsl2ShdslEndpointCurr15MinSES,
```

```
      hdsl2ShdslEndpointCurr15MinCRCanomalies,
      hdsl2ShdslEndpointCurr15MinLOSWS,
      hdsl2ShdslEndpointCurr15MinUAS,
      hdsl2ShdslEndpointCurr1DayTimeElapsed,
      hdsl2ShdslEndpointCurr1DayES,
      hdsl2ShdslEndpointCurr1DaySES,
      hdsl2ShdslEndpointCurr1DayCRCanomalies,
      hdsl2ShdslEndpointCurr1DayLOSWS,
      hdsl2ShdslEndpointCurr1DayUAS
      }
      STATUS      current
      DESCRIPTION
        "This group supports objects which provide current status and
         performance measurements relating to segment endpoints in
         HDSL2/SHDSL lines."
      ::= { hdsl2ShdslGroups 7 }

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

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

```
     ::= { hdsl2ShdslGroups 9 }

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

  hdsl2ShdslEndpointAlarmConfGroup OBJECT-GROUP
     OBJECTS
     {
     hdsl2ShdslEndpointAlarmConfProfile,
     hdsl2ShdslEndpointThreshLoopAttenuation,
     hdsl2ShdslEndpointThreshSNRMargin,
     hdsl2ShdslEndpointThreshES,
     hdsl2ShdslEndpointThreshSES,
     hdsl2ShdslEndpointThreshCRCanomalies,
     hdsl2ShdslEndpointThreshLOSWS,
     hdsl2ShdslEndpointThreshUAS,
     hdsl2ShdslEndpointAlarmConfProfileRowStatus
     }
     STATUS      current
     DESCRIPTION
       "This group supports objects that allow configuration of alarm
        thresholds for various performance parameters for HDSL2/SHDSL
        lines."
     ::= { hdsl2ShdslGroups 11 }

  hdsl2ShdslNotificationGroup NOTIFICATION-GROUP
     NOTIFICATIONS
     {
     hdsl2ShdslLoopAttenCrossing,
     hdsl2ShdslSNRMarginCrossing,
     hdsl2ShdslPerfESThresh,
     hdsl2ShdslPerfSESThresh,
     hdsl2ShdslPerfCRCanomaliesThresh,
     hdsl2ShdslPerfLOSWSThresh,
     hdsl2ShdslPerfUASThresh,
```

```
         hdsl2ShdslSpanInvalidNumRepeaters,
         hdsl2ShdslLoopbackFailure,
         hdsl2ShdslpowerBackoff,
         hdsl2ShdsldeviceFault,
         hdsl2ShdsldcContinuityFault,
         hdsl2ShdslconfigInitFailure,
         hdsl2ShdslprotocolInitFailure,
         hdsl2ShdslnoNeighborPresent,
         hdsl2ShdslLocalPowerLoss
         }
      STATUS      current
      DESCRIPTION
        "This group supports notifications of significant conditions
         associated with HDSL2/SHDSL lines."
      ::= { hdsl2ShdslGroups 12 }

   hdsl2ShdslSpanConfProfileGroup OBJECT-GROUP
      OBJECTS
         {
         hdsl2ShdslSpanConfWireInterface,
         hdsl2ShdslSpanConfMinLineRate,
         hdsl2ShdslSpanConfMaxLineRate,
         hdsl2ShdslSpanConfPSD,
         hdsl2ShdslSpanConfTransmissionMode,
         hdsl2ShdslSpanConfRemoteEnabled,
         hdsl2ShdslSpanConfPowerFeeding,
         hdsl2ShdslSpanConfCurrCondTargetMarginDown,
         hdsl2ShdslSpanConfWorstCaseTargetMarginDown,
         hdsl2ShdslSpanConfCurrCondTargetMarginUp,
         hdsl2ShdslSpanConfWorstCaseTargetMarginUp,
         hdsl2ShdslSpanConfUsedTargetMargins,
         hdsl2ShdslSpanConfReferenceClock,
         hdsl2ShdslSpanConfLineProbeEnable,
         hdsl2ShdslSpanConfProfileRowStatus
         }
      STATUS      current
      DESCRIPTION
        "This group supports objects that constitute configuration
         profiles for configuring span related parameters in SHDSL
         lines."
      ::= { hdsl2ShdslGroups 13 }

   hdsl2ShdslWirePairGroup OBJECT-GROUP
      OBJECTS
         {
         hdsl2ShdslEndpointCurrTipRingReversal,
         hdsl2ShdslEndpointCurrActivationState
         }
```

```
      STATUS       current
      DESCRIPTION
        "This group supports objects 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
```

[4](). 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 HDSL2 unit as these objects are indexed by

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

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

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

5. Security Considerations

There are a number of management objects defined in this MIB module
with a MAX-ACCESS clause of read-write and/or read-create. Such
objects may be considered sensitive or vulnerable in some network
environments. The support for SET operations in a non-secure
environment without proper protection can have a negative effect on
network operations. These are the tables and objects and their
sensitivity/vulnerability:

o hdsl2ShdslSpanConfTable

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

   * hdsl2ShdslSpanConfNumRepeaters
   * hdsl2ShdslSpanConfProfile
   * hdsl2ShdslSpanConfAlarmProfile

   Unauthorized changes to hdsl2ShdslSpanConfNumRepeaters could
   result in a hdsl2ShdslSpanInvalidNumRepeaters notification. Note
   the discussion on hdsl2ShdslSpanInvalidNumRepeaters in the
   Notifications Section above.

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

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

o hdsl2ShdslEndpointConfTable

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

o hdsl2ShdslEndpointMaintTable

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

   * hdsl2ShdslMaintLoopbackConfig
   * hdsl2ShdslMaintPowerBackoff
   * hdsl2ShdslMaintSoftRestart

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

   Unauthorized changes to hdsl2ShdslMaintPowerBackoff could result
   in an increased in bundle interference.

   Unauthorized changes to hdsl2ShdslMaintSoftRestart could result in
   a temporary interruption of end-to-end data transfer as the result
   of the triggering of a soft restart.

o hdsl2ShdslUnitMaintTable

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

o hdsl2ShdslSpanConfProfileTable

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

   * hdsl2ShdslSpanConfWireInterface
   * hdsl2ShdslSpanConfMinLineRate
   * hdsl2ShdslSpanConfMaxLineRate
   * hdsl2ShdslSpanConfPSD
   * hdsl2ShdslSpanConfTransmissionMode
   * hdsl2ShdslSpanConfRemoteEnabled
   * hdsl2ShdslSpanConfPowerFeeding
   * hdsl2ShdslSpanConfCurrCondTargetMarginDown
   * hdsl2ShdslSpanConfWorstCaseTargetMarginDown
   * hdsl2ShdslSpanConfCurrCondTargetMarginUp
   * hdsl2ShdslSpanConfWorstCaseTargetMarginUp
   * hdsl2ShdslSpanConfUsedTargetMargins
   * hdsl2ShdslSpanConfReferenceClock
   * hdsl2ShdslSpanConfLineProbeEnable

   * hdsl2ShdslSpanConfProfileRowStatus

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

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

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

   Unauthorized changes to hdsl2ShdslSpanConfPSD or
   hdsl2ShdslSpanConfTransmissionMode could have a detrimental effect
   loop reach, performance, or spectral compatibility.

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

   Unauthorized changes to hdsl2ShdslSpanConfPowerFeeding could
   shutdown units that are expected to be feed power remotely.
   Changing the configuration such that wetting current is not
   supplied may result in corrosion of electrical contacts.

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

   Unauthorized changes to hdsl2ShdslSpanConfReferenceClock could
   result in the selection of a clock source which might either
   prevent any data from being transferred or impair data transfer.
   In addition, an increase in CRC anomalies may be experienced.

   Unauthorized changes to hdsl2ShdslSpanConfLineProbeEnable could
   have a negative effect on selecting the optimum rate or power

level based on current line conditions.

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

o   hdsl2ShdslEndpointAlarmConfProfileTable

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

*   hdsl2ShdslEndpointThreshLoopAttenuation
*   hdsl2ShdslEndpointThreshSNRMargin
*   hdsl2ShdslEndpointThreshES
*   hdsl2ShdslEndpointThreshSES
*   hdsl2ShdslEndpointThreshCRCanomalies
*   hdsl2ShdslEndpointThreshLOSWS
*   hdsl2ShdslEndpointThreshUAS
*   hdsl2ShdslEndpointAlarmConfProfileRowStatus

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

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

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

Some of the readable objects in this MIB module (i.e., objects with a
MAX-ACCESS other than not-accessible) may be considered sensitive or
vulnerable in some network environments. It is thus important to
control even GET and/or NOTIFY access to these objects and possibly
to even encrypt the values of these objects when sending them over

the network via SNMP. These are the tables and objects and their
sensitivity/vulnerability:

o hdsl2ShdslInventoryTable

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

   * hdsl2ShdslInvVendorID
   * hdsl2ShdslInvVendorModelNumber
   * hdsl2ShdslInvVendorSerialNumber
   * hdsl2ShdslInvVendorEOCSoftwareVersion
   * hdsl2ShdslInvStandardVersion
   * hdsl2ShdslInvVendorListNumber
   * hdsl2ShdslInvVendorIssueNumber
   * hdsl2ShdslInvVendorSoftwareVersion
   * hdsl2ShdslInvEquipmentCode
   * hdsl2ShdslInvVendorOther
   * hdsl2ShdslInvTransmissionModeCapability

SNMP versions prior to SNMPv3 did not include adequate security.
Even if the network itself is secure (for example by using IPSec),
even then, there is no control as to who on the secure network is
allowed to access and GET/SET (read/change/create/delete) the objects
in this MIB module.

It is RECOMMENDED that implementers consider the security features as
provided by the SNMPv3 framework (see [RFC3410], Section 8),
including full support for the SNMPv3 cryptographic mechanisms (for
authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT
RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to
enable cryptographic security. It is then a customer/operator
responsibility to ensure that the SNMP entity giving access to an
instance of this MIB module is properly configured to give access to
the objects only to those principals (users) that have legitimate
rights to indeed GET or SET (change/create/delete) them.

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