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Definitions of Managed Objects for G.shdsl.bis Lines
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Abstract

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

   Single-Pair High-Speed Digital Subscriber Line (SHDSL) interfaces.
   This document introduces extensions to several objects and textual
   conventions defined in HDSL2-SHDSL-Line MIB (RFC 3276). The MIB
   module described in this document will obsolete the MIB module
   described in RFC 3276.

Table of Contents

1. Introduction

This document defines a Management Information Base (MIB) module for
use with network management protocols in the Internet community. The
MIB module described in RFC 3276 [RFC3276] describes objects used for
managing High Bit-Rate DSL - 2nd generation (HDSL2) [T1E1.4] and
Single-Pair High-Speed Digital Subscriber Line (SHDSL) interfaces
[G.991.2]. This document obsoletes RFC 3276 [RFC3276] which supports
G.shdsl in that the MIB module described herein supports G.shdsl.bis
as described in the G.991.2 [G.991.2]. In addition, objects have
been added to improve the management of SHDSL lines.

2. The Internet-Standard Management Framework

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

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

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

3. Introduction

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

The MIB is located in the MIB tree under MIB 2 transmission, as

discussed in the MIB-2 Integration (RFC 3418 [RFC3418] and RFC 2863 [RFC2863]) section of this document.

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

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

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

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

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

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

3.1.2 **Usage of ifTable**

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

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

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

       ifIndex                 Interface index.


       ifDescr                 See interfaces MIB [RFC2863].


       ifType                  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].


       ifLinkUpDownTrapEnable  Default to enabled(1).


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


       ifConnectorPresent      Set as appropriate.


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

3.2 IANA Considerations

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

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

[4.1](#) Naming Conventions

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

4.2 Textual Conventions

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

o Hdsl2ShdslUnitId:

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

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

o Hdsl2ShdslUnitSide:

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

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

o Hdsl2ShdslWirePair:

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

      wirePair1(1)   - First pair for HDSL2/SHDSL.
      wirePair2(2)   - Optional second pair for SHDSL only.

         wirePair3(3)   - Optional third pair for SHDSL.bis only.
         wirePair4(4)   - Optional fourth pair for SHDSL.bis only.

   o Hdsl2ShdslTransmissionModeType:

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

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

   o Hdsl2ShdslPerfCurrDayCount:

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

   o Hdsl2Shdsl1DayIntervalCount:

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

   o Hdsl2ShdslPerfTimeElapsed:

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

   o Hdsl2ShdslPerfIntervalThreshold:

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

   o Hdsl2ShdslClockReferenceType:

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

4.3 **Structure**

   The MIB is structured into following MIB groups:

   o Span Configuration Group:

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

         - hdsl2ShdslSpanConfTable

   o Span Status Group:

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

         - hdsl2ShdslSpanStatusTable

   o Unit Inventory Group:

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

         - hdsl2ShdslInventoryTable

   o Segment Endpoint Configuration Group:

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

         - hdsl2ShdslEndpointConfTable

   o Segment Endpoint Current Status/Performance Group:

      This group supports MIB objects that provide the current status/
      performance information relating to segment endpoints. It
      contains the following table:

         - hdsl2ShdslEndpointCurrTable

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

      This group supports MIB objects that provide historic status/
      performance information relating to segment endpoints in 15-minute
      intervals. It contains the following table:

- hdsl2Shdsl15MinIntervalTable

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

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

             - hdsl2Shdsl1DayIntervalTable

    o Maintenance Group:

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

    - hdsl2ShdslEndpointMaintTable
    - hdsl2ShdslUnitMaintTable

o   Span Configuration Profile Group:

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

    - hdsl2ShdslSpanConfProfileTable

o   Segment Endpoint Alarm Configuration Profile Group:

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

    - hdsl2ShdslEndpointAlarmConfProfileTable

o   Notifications Group:

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

      - hdsl2ShdslLoopAttenCrossing
      - hdsl2ShdslSNRMarginCrossing
      - hdsl2ShdslPerfESThresh
      - hdsl2ShdslPerfSESThresh
      - hdsl2ShdslPerfCRCanomaliesThresh
      - 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

4.3.1 **Line Topology**

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

       <-- 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

4.4 **Counters, Interval Buckets and Thresholds**

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

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

Not reporting an interval will result in holes in the associated
table. For example, the table, 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).

4.5 Profiles

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

The following profiles are used in this MIB:

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

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

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

4.6 Notifications

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

A linkDown notification MAY be generated whenever any of ES, SES, CRC
Anomaly, LOSW, or UAS event occurs. The corresponding linkUp

notification MAY be sent when all link failure conditions are
cleared.

The notifications defined in this MIB are for initialization failure
and for the threshold crossings associated with the following events:
ES, SES, CRC Anomaly, LOSW, and UAS. Each threshold has its own

enable/threshold value. When that value is 0, the notification is
disabled.

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

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

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

A 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.

5. Conformance and Compliance

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

        hdsl2ShdslSpanConfGroup
        hdsl2ShdslSpanStatusGroup
        hdsl2ShdslInventoryGroup
        hdsl2ShdslEndpointConfGroup
        hdsl2Shdsl15MinIntervalGroup
        hdsl2Shdsl1DayIntervalGroup
        hdsl2ShdslMaintenanceGroup
        hdsl2ShdslEndpointAlarmConfGroup
        hdsl2ShdslNotificationGroup
        hdsl2ShdslWirePairGroup
        hdsl2ShdslPayloadRateGroup

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

        hdsl2ShdslSpanConfProfileGroup
        hdsl2ShdslSpanShdslStatusGroup
        hdsl2ShdslWirePairGroup
        hdsl2ShdslPayloadRateGroup

6. Definitions

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

    IMPORTS
    MODULE-IDENTITY,
    OBJECT-TYPE,
    Counter32,

```
    Unsigned32,
    Gauge32,
    NOTIFICATION-TYPE,
    Integer32,
    transmission                FROM SNMPv2-SMI
    RowStatus,
    TEXTUAL-CONVENTION          FROM SNMPv2-TC
```

```
   ifIndex                       FROM IF-MIB
   PerfCurrentCount,
   PerfIntervalCount             FROM PerfHist-TC-MIB
   SnmpAdminString               FROM SNMP-FRAMEWORK-MIB
   MODULE-COMPLIANCE,
   OBJECT-GROUP,
   NOTIFICATION-GROUP            FROM SNMPv2-CONF;


   hdsl2ShdslMIB MODULE-IDENTITY
       LAST-UPDATED "200409100000Z" -- September 10, 2004
       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 is designed to require no management
         communication between the modems beyond that inherent in the

low-level EOC line protocol as defined in ANSI T1E1.4/2000-006
(for HDSL2 lines), or in ITU G.991.2 (for SHDSL lines)."

REVISION   "200409100000Z" -- September 10, 2004
DESCRIPTION "Initial version, published as RFC xxxx.
        The following changes have been made from RFC 3276:
          1. Added a 3rd and 4th wire pair.
          2. Modified all rates such that their rates are only
              constrained by an unsigned 32-bit value and not by
              what today's perceived technology limitations are.
          3. Clarified that the rates from RFC 32766 include
              payload and any applicable framing and added
              objects for payload-only rates.
          4. Added an object to indicate whether or not the
              tip and ring are reversed on a wire pair.
          5. Added an object to display the activation state
              of a wire pair.
          6. Added references as necessary for clarification.
          7. Added display hints to textual conventions as
              necessary.
          8. Updated conformance statements as necessary.
          9. Some changes were due to IETF requirements and
              RFC generation tools."

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

::= { transmission 48 }

hdsl2ShdslMibObjects OBJECT IDENTIFIER ::= { hdsl2ShdslMIB 1 }

-- Textual Conventions used in this MIB
--

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

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

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

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


         worstCaseDown   - worst case downstream target SNR margin
                           enabled


         currCondUp      - current condition upstream target SNR
                           margin enabled


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


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


   hdsl2ShdslSpanConfLineProbeEnable OBJECT-TYPE
      SYNTAX        INTEGER
                    {
                    disable(1),
                    enable(2)
                    }
      MAX-ACCESS  read-create
      STATUS        current
      DESCRIPTION
        "This object enables/disables support for Line Probe of
         the units in a SHDSL line.  When Line Probe is enabled, the
         system performs Line Probing to find the best possible
         rate.  If Line probe is disabled, the rate adaptation phase
         is skipped to shorten set up time."
      DEFVAL        { disable }
      ::= { hdsl2ShdslSpanConfProfileEntry 15 }


   hdsl2ShdslSpanConfProfileRowStatus OBJECT-TYPE
```

```
SYNTAX       RowStatus
MAX-ACCESS   read-create
STATUS       current
DESCRIPTION
  "This object controls creation/deletion of the associated
   entry in this table per the semantics of RowStatus.  If an
```

          active entry is referenced in 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  current
      DESCRIPTION
        "The section outlines compliance requirements for this MIB."
      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."

    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 }



   -- 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
```

[7](#). Implementation Analysis

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

```
    hdsl2ShdslEndpointCurrAtn.1.1.1.2
```

might return

```
    hdsl2ShdslEndpointCurrAtn.1.1.1.3 = 0
```

with a G.shdsl.bis unit and

```
hdsl2ShdslEndpointCurrSnrMgn.1.1.1.1 = 0
```

with an 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.

8. Security Considerations

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

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

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

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

Further, deployment of SNMP versions prior to SNMPv3 is NOT
RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to
enable cryptographic security. It is then a customer/operator
responsibility to ensure that the SNMP entity giving access to an
instance of this MIB module is properly configured to give access to

the objects only to those principals (users) that have legitimate
rights to indeed GET or SET (change/create/delete) them.

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

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

There are a number of managed objects in this MIB that may be
considered to contain sensitive information. Access to these objects
would allow an intruder to obtain information about which vendor's
equipment is in use on the network. Further, such information is
considered sensitive in many environments for competitive reasons.

These identifying objects in the inventory group are:

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

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

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

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

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

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

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

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

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

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