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

Status of this Memo

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Abstract

This document defines a portion of the 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 DSL - 2nd generation (HDSL2) and Single-Pair High-Speed Digital Subscriber Line (SHDSL) interfaces.

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1. Introduction

This document defines a portion of the 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 DSL - 2nd generation (HDSL2) [18] and Single-Pair High-Speed Digital Subscriber Line (SHDSL) interfaces [19].

2. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- An overall architecture, described in RFC 2571 [1].
- Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIv1 and is described in STD 16, RFC 1155 [2], STD 16, RFC 1212 [3], and RFC 1215 [4]. The second version, called SMIv2, is described in STD 58, RFC 2578 [5], RFC 2579 [6], and RFC 2580 [7].
- Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and is described in STD 15, RFC 1157 [8]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described is in RFC 1901 [9] and RFC 1906 [10]. The third version of the message protocol is called SNMPv3 and is described in RFC 1906 [10], RFC 2572 [11], and RFC 2574 [12].
- Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, RFC 1157 [8]. A second set of protocol operations and associated PDU formats is described in RFC 1905 [13].
- A set of fundamental applications described in RFC 2573 [14] and the view-based access control mechanism described in RFC 2575 [15].

A more detailed introduction to the current SNMP Management Framework can be found in RFC 2570 [16].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIv2. A MIB conforming to the SMIv1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIv2 will be converted into textual descriptions in SMIv1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

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 [17].

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 ANSI T1E1.4/2000-006 [18] and ITU G.991.2 [19].

The MIB is located in the MIB tree under MIB 2 transmission, as discussed in the MIB-2 Integration (RFC 1213 [20] and RFC 2863 [21]) 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 [21] 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 [21]. 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 [21] 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 [21], and are not duplicated in the HDSL2/SHDSL Line MIB.

ifIndex	Interface index.
ifDescr	See interfaces MIB [21].
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 [21].
ifOperStatus	See interfaces MIB [21].
ifLastChange	See interfaces MIB [21].
ifName	See interfaces MIB [21].
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 [19].
G. ES means errored second [19].
H. LOSW means loss of sync word [19].
I. LOSWS means LOSW seconds [19].
J. SES means severely errored second [19].
K. SNR means signal-to-noise ratio [19].
L. UAS means unavailable second [19].

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)                - CO terminal unit
xtuR(2)                - 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.
```

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

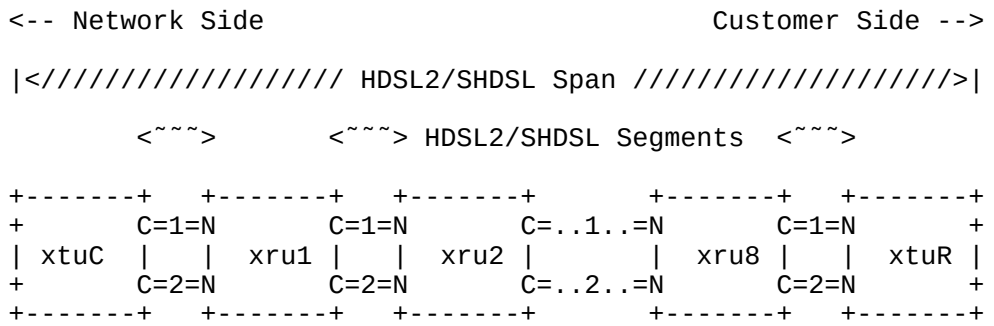
o Notifications Group:

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

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.



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 2493 [22] and RFC 2662 [23], 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:

- 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 end point in the span. If a different configuration is provisioned for any given segment end point within the span, the new configuration for this segment end point will override the span configuration for this segment end point only.

- 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 2571 [1]).

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 [21]) which are per agent (e.g., per Digital Subscriber Line Access Multiplexer, or DSLAM, in such a device), and linkUp/linkDown (per [21]) 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 [21]). 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

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

- hdsl2ShdslSpanConfProfileGroup
- hdsl2ShdslSpanShdslStatusGroup

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 "200205090000Z" -- May 9, 2002
    ORGANIZATION "ADSLMIB Working Group"
    CONTACT-INFO "WG-email:  adslmib@ietf.org
                  Info:      https://www1.ietf.org/mailman/listinfo/adslmib
                  Chair:     Mike Sneed
```

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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 "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
   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
   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
   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
   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), while SHDSL
      supports an optional second pair (wirePair2)."
   SYNTAX    INTEGER
             {
             wirePair1(1),
             wirePair2(2)
             }

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
```

```
   }

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..4112000)
   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."
   ::= { hdsl2ShdslSpanStatusEntry 2 }

hdsl2ShdslStatusActualLineRate OBJECT-TYPE
   SYNTAX      Unsigned32(0..4112000)
   UNITS       "bps"
   MAX-ACCESS  read-only
   STATUS      current
   DESCRIPTION
     "Contains the actual line rate in this HDSL2/SHDSL span.  This
     should equal ifSpeed."
   ::= { 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 }

-- 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."
   ::= { 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."
   ::= { 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."
   ::= { hdsl2ShdslInventoryEntry 4 }

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

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
     bitmap of possible conditions. The various bit positions
     are:
```

```
      noDefect               There 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 }

-- 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. 1 is the 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 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 (eg. 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)
               }
   MAX-ACCESS  read-create
   STATUS      current
   DESCRIPTION
     "This object configures the two-wire or optional four-wire
      operation for SHDSL Lines."
   DEFVAL      { twoWire }
   ::= { hdsl2ShdslSpanConfProfileEntry 2 }

hdsl2ShdslSpanConfMinLineRate OBJECT-TYPE
   SYNTAX      Unsigned32(0..4112000)
   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).  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..4112000)
   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).  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."

   ::= { 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 }
END
```

7. Security Considerations

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 (section 6.4) 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 2574 [12] and the View-based Access Control Model RFC 2575 [15] 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. 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.

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10. Intellectual Property Notice

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