Definitions of Managed Objects for the DS3/E3 Interface Type

Status of this Memo

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Abstract

   This memo defines a portion of the Management Information Base (MIB)
   for use with network management protocols in the Internet community.
   In particular, it describes objects used for managing DS3 and E3
   interfaces. This document is a companion document with Definitions
   of Managed Objects for the DS0 (RFC 2494 [25]), DS1/E1/DS2/E2 (RFC
   2495 [17]), and the work in progress SONET/SDH Interface Types.

   This memo specifies a MIB module in a manner that is both compliant
   to the SNMPv2 SMI, and semantically identical to the peer SNMPv1
   definitions.

Table of Contents

1. The SNMP Management Framework

   The SNMP Management Framework presently consists of five major
   components:

   o   An overall architecture, described in RFC 2271 [1].

   o   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 described in
        STD 16, RFC 1155 [2], STD 16, RFC 1212 [3] and RFC 1215 [4]. The
        second version, called SMIv2, is described in RFC 1902 [5], RFC
        1903 [6] and RFC 1904 [7].

   o   Message protocols for transferring management information. The
        first version of the SNMP message protocol is called SNMPv1 and
        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 in RFC 1901 [9] and
        RFC 1906 [10]. The third version of the message protocol is
        called SNMPv3 and described in RFC 1906 [10], RFC 2272 [11] and
        RFC 2274 [12].

o   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].

o   A set of fundamental applications described in RFC 2273 [14] and
    the view-based access control mechanism described in RFC 2275
    [15]. 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.

1.1. Changes from RFC1407

    This MIB obsoletes RFC1407. The changes from RFC1407 are the
    following:

        (1) The Fractional Table has been deprecated

        (2) This document uses SMIv2

        (3) Values are given for ifTable and ifXTable

        (4) Example usage of ifStackTable is included

        (5) dsx3IfIndex has been deprecated

        (6) The definition of valid intervals has been clarified
             for the case where the agent proxied for other devices. In
             particular, the treatment of missing intervals has been
             clarified.

        (7) An inward loopback has been added.

        (8) Additional lineStatus bits have been added for Near End
             in Unavailable Signal State, Carrier Equipment Out of
             Service, DS@ Payload AIS, and DS@ Performance Threshold

(9) A read-write line Length object has been added.

(10) Added a lineStatus last change, trap and enabler.

(11) Textual Conventions for statistics objects have
     been used.

(12) A new object, dsx3LoopbackStatus, has been introduced to
     reflect the loopbacks established on a DS3/E3 interface and
     the source to the requests. dsx3LoopbackConfig continues
     to be the desired loopback state while dsx3LoopbackStatus
     reflects the actual state.

(13) A dual loopback has been added to allow the setting of an
     inward loopback and a line loopback at the same time.

(14) An object has been added to indicated whether or not this
     is a channelized DS3/E3.

(15) A new object has been added to indicate which DS1 is to set
     for remote loopback.

2. Overview

These objects are used when the particular media being used to
realize an interface is a DS3/E3 interface. At present, this applies
to these values of the ifType variable in the Internet-standard MIB:

    ds3 (30)

The DS3 definitions contained herein are based on the DS3
specifications in ANSI T1.102-1987, ANSI T1.107-1988, ANSI T1.107a-
1990, and ANSI T1.404-1989 [8,9,9a,10]. The E3 definitions contained
herein are based on the E3 specifications in CCITT G.751 [12].

2.1. Use of ifTable for DS3 Layer

   Only the ifGeneralGroup needs to be supported.

            ifTable Object   Use for DS3 Layer
==
            ifIndex   Interface index.

            ifDescr   See interfaces MIB [5]

            ifType   ds3(30)

            ifSpeed   Speed of line rate
                               DS3 - 44736000
                               E3 - 34368000

            ifPhysAddress   The value of the Circuit Identifier.
                               If no Circuit Identifier has been assigned
                               this object should have an octet string
                               with zero length.

            ifAdminStatus   See interfaces MIB [5]

            ifOperStatus   See interfaces MIB [5]

            ifLastChange   See interfaces MIB [5]

            ifName   See interfaces MIB [5]

            ifLinkUpDownTrapEnable   Set to enabled(1).

            ifHighSpeed   Speed of line in Mega-bits per second
                               (either 45 or 34)

            ifConnectorPresent Set to true(1) normally, except for
                                cases such as DS3/E3 over AAL1/ATM where
                                false(2) is appropriate

2.2. Usage Guidelines

2.2.1. Usage of ifStackTable

   The assignment of the index values could for example be:

            ifIndex   Description
            1   Ethernet
            2   Line#A Router
            3   Line#B Router

```
          4           Line#C Router
          5           Line#D Router
          6           Line#A CSU Router
          7           Line#B CSU Router
          8           Line#C CSU Router
          9           Line#D CSU Router
          10          Line#A CSU Network
          11          Line#B CSU Network
          12          Line#C CSU Network
          13          Line#D CSU Network
```

   The ifStackTable is then used to show the relationships between the
   various DS3 interfaces.

```
          ifStackTable Entries


          HigherLayer    LowerLayer
          2              6
          3              7
          4              8
          5              9
          6              10
          7              11
          8              12
          9              13
```

   If the CSU shelf is managed by itself by a local SNMP Agent, the
   situation would be identical, except the Ethernet and the 4 router
   interfaces are deleted. Interfaces would also be numbered from 1 to
   8.

```
          ifIndex   Description
          1         Line#A CSU Router
          2         Line#B CSU Router
          3         Line#C CSU Router
          4         Line#D CSU Router
          5         Line#A CSU Network
          6         Line#B CSU Network
          7         Line#C CSU Network
          8         Line#D CSU Network

          ifStackTable Entries

          HigherLayer    LowerLayer
          1              5
          2              6
          3              7
          4              8
```

2.2.2. Usage of Channelization for DS3, DS1, DS0

   An example is given here to explain the channelization objects in the
   DS3, DS1, and DS0 MIBs to help the implementor use the objects
   correctly. Treatment of E3 and E1 would be similar, with the number
   of DS0s being different depending on the framing of the E1.

   Assume that a DS3 (with ifIndex 1) is Channelized into DS1s (without
   DS2s). The object dsx3Channelization is set to enabledDs1. When
   this object is set to enabledDS1, 28 ifEntries of type DS1 will be
   created by the agent. If dsx3Channelization is set to disabled, then
   the DS1s are destroyed.

   Assume the entries in the ifTable for the DS1s are created in channel
   order and the ifIndex values are 2 through 29. In the DS1 MIB, there
   will be an entry in the dsx1ChanMappingTable for each ds1. The
   entries will be as follows:

        dsx1ChanMappingTable Entries

        ifIndex   dsx1Ds1ChannelNumber   dsx1ChanMappedIfIndex

        1   1   2
        1   2   3
        ......
        1   28   29

   In addition, the DS1s are channelized into DS0s. The object
   dsx1Channelization is set to enabledDS0 for each DS1. There will be
   24 DS0s in the ifTable for each DS1. Assume the entries in the
   ifTable are created in channel order and the ifIndex values for the
   DS0s in the first DS1 are 30 through 53. In the DS0 MIB, there will
   be an entry in the dsx0ChanMappingTable for each DS0. The entries
   will be as follows:

        dsx0ChanMappingTable Entries

        ifIndex   dsx0Ds0ChannelNumber dsx0ChanMappedIfIndex
        2   1   30
        2   2   31
        ......
        2   24   53

2.2.3. Usage of Channelization for DS3, DS2, DS1

   An example is given here to explain the channelization objects in the
   DS3 and DS1 MIBs to help the implementor use the objects correctly.

Assume that a DS3 (with ifIndex 1) is Channelized into DS2s. The
object dsx3Channelization is set to enabledDs2. There will be 7 DS2s
(ifType of DS1) in the ifTable. Assume the entries in the ifTable
for the DS2s are created in channel order and the ifIndex values are
2 through 8. In the DS1 MIB, there will be an entry in the
dsx1ChanMappingTable for each DS2. The entries will be as follows:

dsx1ChanMappingTable Entries

ifIndex	dsx1Ds1ChannelNumber	dsx1ChanMappedIfIndex
1	1	2
1	2	3
......		
1	7	8

In addition, the DS2s are channelized into DS1s. The object
dsx1Channelization is set to enabledDS1 for each DS2. There will be
4 DS1s in the ifTable for each DS2. Assume the entries in the
ifTable are created in channel order and the ifIndex values for the
DS1s in the first DS2 are 9 through 12, then 13 through 16 for the
second DS2, and so on. In the DS1 MIB, there will be an entry in the
dsx1ChanMappingTable for each DS1. The entries will be as follows:

dsx1ChanMappingTable Entries

ifIndex	dsx1Ds1ChannelNumber	dsx1ChanMappedIfIndex
2	1	9
2	2	10
2	3	11
2	4	12
3	1	13
3	2	14
...		
8	4	36

2.2.4. Usage of Loopbacks

This section discusses the behaviour of objects related to loopbacks.

The object dsx3LoopbackConfig represents the desired state of
loopbacks on this interface. Using this object a Manager can
request:
      LineLoopback
      PayloadLoopback (if ESF framing)
      InwardLoopback
      DualLoopback (Line + Inward)
      NoLoopback

The remote end can also request lookbacks either through the FDL
channel if ESF or inband if D4. The loopbacks that can be request
this way are:
LineLoopback
PayloadLoopback (if ESF framing)
NoLoopback

To model the current state of loopbacks on a DS3 interface, the
object dsx3LoopbackStatus defines which loopback is currently applies
to an interface. This objects, which is a bitmap, will have bits
turned on which reflect the currently active loopbacks on the
interface as well as the source of those loopbacks.

The following restrictions/rules apply to loopbacks:

The far end cannot undo loopbacks set by a manager.

A manager can undo loopbacks set by the far end.

Both a line loopback and an inward loopback can be set at the same
time. Only these two loopbacks can co-exist and either one may be
set by the manager or the far end. A LineLoopback request from the
far end is incremental to an existing Inward loopback established by
a manager. When a NoLoopback is received from the far end in this
case, the InwardLoopback remains in place.

2.3. Objectives of this MIB Module

There are numerous things that could be included in a MIB for DS3/E3
signals: the management of multiplexors, CSUs, DSUs, and the like.
The intent of this document is to facilitate the common management of
all devices with DS3/E3 interfaces. As such, a design decision was
made up front to very closely align the MIB with the set of objects
that can generally be read from DS3/E3 devices that are currently
deployed.

2.4. DS3/E3 Terminology

The terminology used in this document to describe error conditions on
a DS3 interface as monitored by a DS3 device are based on the late
but not final draft of what became the ANSI T1.231 standard [11]. If
the definition in this document does not match the definition in the
ANSI T1.231 document, the implementer should follow the definition
described in this document.

2.4.1. Error Events

     Bipolar Violation (BPV) Error Event
          A bipolar violation error event, for B3ZS(HDB3)-coded signals,
          is the occurrence of a pulse of the same polarity as the
          previous pulse without being part of the zero substitution
          code, B3ZS(HDB3). For B3ZS(HDB3)-coded signals, a bipolar
          violation error event may also include other error patterns
          such as: three(four) or more consecutive zeros and incorrect
          polarity. (See T1.231 section 7.1.1.1.1)

     Excessive Zeros (EXZ) Error Event
          An EXZ is the occurrence of any zero string length equal to or
          greater than 3 for B3ZS, or greater than 4 for HDB3. (See
          T1.231 section 7.1.1.1.2)

     Line Coding Violation (LCV) Error Event
          This parameter is a count of both BPVs and EXZs occurring over
          the accumulation period. An EXZ increments the LCV by one
          regardless of the length of the zero string. (Also known as
          CV-L. See T1.231 section 7.4.1.1)

     P-bit Coding Violation (PCV) Error Event
          For all DS3 applications, a coding violation error event is a
          P-bit Parity Error event. A P-bit Parity Error event is the
          occurrence of a received P-bit code on the DS3 M-frame that is
          not identical to the corresponding locally- calculated code.
          (See T1.231 section 7.1.1.2.1)

     C-bit Coding Violation (CCV) Error Event
          For C-bit Parity and SYNTRAN DS3 applications, this is the
          count of coding violations reported via the C-bits. For C-bit
          Parity, it is a count of CP-bit parity errors occurring in the
          accumulation interval. For SYNTRAN, it is a count of CRC-9
          errors occurring in the accumulation interval. (See T1.231
          section 7.1.1.2.2)

2.4.2. Performance Parameters

   All performance parameters are accumulated in fifteen minute
   intervals and up to 96 intervals (24 hours worth) are kept by an
   agent. Fewer than 96 intervals of data will be available if the
   agent has been restarted within the last 24 hours. In addition,
   there is a rolling 24-hour total of each performance parameter.

There is no requirement for an agent to ensure fixed relationship
between the start of a fifteen minute interval and any wall clock;
however some agents may align the fifteen minute intervals with
quarter hours.

Performance parameters are of types PerfCurrentCount,
PerfIntervalCount and PerfTotalCount. These textual conventions are
all Gauge32, and they are used because it is possible for these
objects to decrease. Objects may decrease when Unavailable Seconds
occurs across a fifteen minutes interval boundary. See Unavailable
Seconds discussion later in this section.

    Line Errored Seconds (LES)
         A Line Errored Second is a second in which one or more CV
         occurred OR one or more LOS defects. (Also known as ES-L. See
         T1.231 section 7.4.1.2)

    P-bit Errored Seconds (PES)
         An PES is a second with one or more PCVs OR one or more Out of
         Frame defects OR a detected incoming AIS. This gauge is not
         incremented when UASs are counted. (Also known as ESP-P. See
         T1.231 section 7.4.2.2)

    P-bit Severely Errored Seconds (PSES)
         A PSES is a second with 44 or more PCVs OR one or more Out of
         Frame defects OR a detected incoming AIS. This gauge is not
         incremented when UASs are counted. (Also known as SESP-P. See
         T1.231 section 7.4.2.5)

    C-bit Errored Seconds (CES)
         An CES is a second with one or more CCVs OR one or more Out of
         Frame defects OR a detected incoming AIS. This count is only
         for the SYNTRAN and C-bit Parity DS3 applications. This gauge
         is not incremented when UASs are counted. (Also known as
         ESCP-P. See T1.231 section 7.4.2.2)

    C-bit Severely Errored Seconds (CSES)
         A CSES is a second with 44 or more CCVs OR one or more Out of
         Frame defects OR a detected incoming AIS. This count is only
         for the SYNTRAN and C-bit Parity DS3 applications. This gauge
         is not incremented when UASs are counted. (Also known as
         SESCP-P. See T1.231 section 7.4.2.5)

    Severely Errored Framing Seconds (SEFS)
         A SEFS is a second with one or more Out of Frame defects OR a
         detected incoming AIS. This item is not incremented during
         unavailable seconds. (Also known as SAS-P. See T1.231 section
         7.4.2.6)

Unavailable Seconds (UAS)
     UAS are calculated by counting the number of seconds that the
     interface is unavailable. The DS3 interface is said to be
     unavailable from the onset of 10 contiguous PSESs, or the
     onset of the condition leading to a failure (see Failure
     States). If the condition leading to the failure was
     immediately preceded by one or more contiguous PSESs, then the
     DS3 interface unavailability starts from the onset of these
     PSESs. Once unavailable, and if no failure is present, the
     DS3 interface becomes available at the onset of 10 contiguous
     seconds with no PSESs. Once unavailable, and if a failure is
     present, the DS3 interface becomes available at the onset of
     10 contiguous seconds with no PSESs, if the failure clearing
     time is less than or equal to 10 seconds. If the failure
     clearing time is more than 10 seconds, the DS3 interface
     becomes available at the onset of 10 contiguous seconds with
     no PSESs, or the onset period leading to the successful
     clearing condition, whichever occurs later. With respect to
     the DS3 error counts, all counters are incremented while the
     DS3 interface is deemed available. While the interface is
     deemed unavailable, the only count that is incremented is
     UASs.

     Note that this definition implies that the agent cannot
     determine until after a ten second interval has passed whether
     a given one-second interval belongs to available or
     unavailable time. If the agent chooses to update the various
     performance statistics in real time then it must be prepared
     to retroactively reduce the PES, PSES, CES, and CSES counts by
     10 and increase the UAS count by 10 when it determines that
     available time has been entered. It must also be prepared to
     adjust the PCV, CCV, and SEFS count as necessary since these
     parameters are not accumulated during unavailable time. It
     must be similarly prepared to retroactively decrease the UAS
     count by 10 and increase the PES, CES, PCV, and CCV counts as
     necessary upon entering available time. A special case exists
     when the 10 second period leading to available or unavailable
     time crosses a 900 second statistics window boundary, as the
     foregoing description implies that the PCV, CCV, PES, CES,
     PSES, CSEC, SEFS, and UAS counts for the PREVIOUS interval
     must be adjusted. In this case successive GETs of the
     affected dsx3IntervalPSESs and dsx3IntervalUASs objects will
     return differing values if the first GET occurs during the
     first few seconds of the window.

The agent may instead choose to delay updates to the various
statistics by 10 seconds in order to avoid retroactive
adjustments to the counters. A way to do this is sketched in
Appendix B.

In any case, a linkDown trap shall be sent only after the
agent has determined for certain that the unavailable state
has been entered, but the time on the trap will be that of the
first UAS (i.e., 10 seconds earlier). A linkUp trap shall be
handled similarly.

According to ANSI T1.231 unavailable time begins at the
onset of 10 contiguous severely errored seconds -- that is,
unavailable time starts with the _first_ of the 10 contiguous
SESs. Also, while an interface is deemed unavailable all
counters for that interface are frozen except for the UAS
count. It follows that an implementation which strictly
complies with this standard must _not_ increment any counters
other than the UAS count -- even temporarily -- as a result of
anything that happens during those 10 seconds. Since changes
in the signal state lag the data to which they apply by 10
seconds, an ANSI-compliant implementation must pass the the
one-second statistics through a 10-second delay line prior to
updating any counters. That can be done by performing the
following steps at the end of each one second interval.

i)   Read near/far end CV counter and alarm status flags from the
     hardware.

ii) Accumulate the CV counts for the preceding second and compare
     them to the ES and SES threshold for the layer in question.
     Update the signal state and shift the one-second CV counts and
     ES/SES flags into the 10-element delay line. Note that far-end
     one-second statistics are to be flagged as "absent" during any
     second in which there is an incoming defect at the layer in
     question or at any lower layer.

iii) Update the current interval statistics using the signal state
     from the _previous_ update cycle and the one-second CV counts
     and ES/SES flags shifted out of the 10-element delay line.

This approach is further described in Appendix B.

2.4.3. Performance Defects

   Failure States:
       The Remote Alarm Indication (RAI) failure, in SYNTRAN
       applications, is declared after detecting the Yellow Alarm

Signal on the alarm channel. See ANSI T1.107a-1990 [9a]. The
Remote Alarm Indication failure, in C-bit Parity DS3
applications, is declared as soon as the presence of either
one or two alarm signals are detected on the Far End Alarm
Channel. See [9]. The Remote Alarm Indication failure may
also be declared after detecting the far-end SEF/AIS defect
(aka yellow). The Remote Alarm Indication failure is cleared
as soon as the presence of the any of the above alarms are
removed.

Also, the incoming failure state is declared when a defect
persists for at least 2-10 seconds. The defects are the
following: Loss of Signal (LOS), an Out of Frame (OOF) or an
incoming Alarm Indication Signal (AIS). The Failure State is
cleared when the defect is absent for less than or equal to 20
seconds.

Far End SEF/AIS defect (aka yellow)
     A Far End SEF/AIS defect is the occurrence of the two X-bits
     in a M-frame set to zero. The Far End SEF/AIS defect is
     terminated when the two X-bits in a M-frame are set to one.
     (Also known as SASCP-PFE. See T1.231 section 7.4.4.2.6)

Out of Frame (OOF) defect
     A DS3 OOF defect is detected when any three or more errors in
     sixteen or fewer consecutive F-bits occur within a DS3 M-
     frame. An OOF defect may also be called a Severely Errored
     Frame (SEF) defect. An OOF defect is cleared when reframe
     occurs. A DS3 Loss of Frame (LOF) failure is declared when
     the DS3 OOF defect is consistent for 2 to 10 seconds. The DS3
     OOF defect ends when reframe occurs. The DS3 LOF failure is
     cleared when the DS3 OOF defect is absent for 10 to 20
     seconds. (See T1.231 section 7.1.2.2.1)

     An E3 OOF defect is detected when four consecutive frame
     alignment signals have been incorrectly received in there
     predicted positions in an E3 signal. E3 frame alignment occurs
     when the presence of three consecutive frame alignment signals
     have been detected.

Loss of Signal (LOS) defect
     The DS3 LOS defect is declared upon observing 175 +/- 75
     contiguous pulse positions with no pulses of either positive
     or negative polarity. The DS3 LOS defect is terminated upon
     observing an average pulse density of at least 33% over a
     period of 175 +/- 75 contiguous pulse positions starting with
     the receipt of a pulse. (See T1.231 section 7.1.2.1.1)

Alarm Indication Signal (AIS) defect
        The DS3 AIS is framed with "stuck stuffing." This implies
        that it has a valid M-subframe alignments bits, M-frame
        alignment bits, and P bits. The information bits are set to a
        1010... sequence, starting with a one (1) after each M-
        subframe alignment bit, M-frame alignment bit, X bit, P bit,
        and C bit. The C bits are all set to zero giving what is
        called "stuck stuffing." The X bits are set to one. The DS3
        AIS defect is declared after DS3 AIS is present in contiguous
        M-frames for a time equal to or greater than T, where 0.2 ms
        <= T <= 100 ms. The DS3 AIS defect is terminated after AIS is
        absent in contiguous M-frames for a time equal to or greater
        than T. (See T1.231 section 7.1.2.2.3)

        The E3 binary content of the AIS is nominally a continuous
        stream of ones. AIS detection and the application of
        consequent actions, should be completed within a time limit of
        1 ms.

2.4.4. Other Terms

    Circuit Identifier
        This is a character string specified by the circuit vendor,
        and is useful when communicating with the vendor during the
        troubleshooting process.

    Proxy
        In this document, the word proxy is meant to indicate an
        application which receives SNMP messages and replies to them
        on behalf of the devices which implement the actual DS3/E3
        interfaces. The proxy may have already collected the
        information about the DS3/E3 interfaces into its local
        database and may not necessarily forward the requests to the
        actual DS3/E3 interface. It is expected in such an
        application that there are periods of time where the proxy is
        not communicating with the DS3/E3 interfaces. In these
        instances the proxy will not necessarily have up-to-date
        configuration information and will most likely have missed the
        collection of some statistics data. Missed statistics data
        collection will result in invalid data in the interval table.

3. Object Definitions

    DS3-MIB DEFINITIONS ::= BEGIN

    IMPORTS
        MODULE-IDENTITY, OBJECT-TYPE,
        NOTIFICATION-TYPE, transmission   FROM SNMPv2-SMI

```
     DisplayString, TimeStamp, TruthValue    FROM SNMPv2-TC
     MODULE-COMPLIANCE, OBJECT-GROUP,
     NOTIFICATION-GROUP                      FROM SNMPv2-CONF
     InterfaceIndex                          FROM IF-MIB
     PerfCurrentCount, PerfIntervalCount,
     PerfTotalCount                          FROM PerfHist-TC-MIB;


 ds3 MODULE-IDENTITY
     LAST-UPDATED "9808012130Z"
     ORGANIZATION "IETF Trunk MIB Working Group"
     CONTACT-INFO
        "        David Fowler

        Postal: Newbridge Networks Corporation
                600 March Road
                Kanata, Ontario, Canada K2K 2E6

                Tel: +1 613 591 3600
                Fax: +1 613 599 3667

        E-mail: davef@newbridge.com"
     DESCRIPTION
         "The is the MIB module that describes
          DS3 and E3 interfaces objects."

      ::= { transmission 30 }

  -- The DS3/E3 Near End Group

  -- The DS3/E3 Near End Group consists of four tables:
  --    DS3/E3 Configuration
  --    DS3/E3 Current
  --    DS3/E3 Interval
  --    DS3/E3 Total

  -- the DS3/E3 Configuration Table

  dsx3ConfigTable OBJECT-TYPE
      SYNTAX  SEQUENCE OF Dsx3ConfigEntry
      MAX-ACCESS  not-accessible
      STATUS  current
      DESCRIPTION
            "The DS3/E3 Configuration table."
      ::= { ds3 5 }

  dsx3ConfigEntry OBJECT-TYPE
      SYNTAX  Dsx3ConfigEntry
```

```
            MAX-ACCESS  not-accessible
            STATUS  current
            DESCRIPTION
                    "An entry in the DS3/E3 Configuration table."
            INDEX   { dsx3LineIndex }
            ::= { dsx3ConfigTable 1 }

      Dsx3ConfigEntry ::=
            SEQUENCE {
                dsx3LineIndex                   InterfaceIndex,
                dsx3IfIndex                     InterfaceIndex,
                dsx3TimeElapsed                 INTEGER,
                dsx3ValidIntervals              INTEGER,
                dsx3LineType                    INTEGER,
                dsx3LineCoding                  INTEGER,
                dsx3SendCode                    INTEGER,
                dsx3CircuitIdentifier           DisplayString,
                dsx3LoopbackConfig              INTEGER,
                dsx3LineStatus                  INTEGER,
                dsx3TransmitClockSource         INTEGER,
                dsx3InvalidIntervals            INTEGER,
                dsx3LineLength                  INTEGER,
                dsx3LineStatusLastChange        TimeStamp,
                dsx3LineStatusChangeTrapEnable  INTEGER,
                dsx3LoopbackStatus              INTEGER,
                dsx3Channelization              INTEGER,
                dsx3Ds1ForRemoteLoop            INTEGER
            }

      dsx3LineIndex OBJECT-TYPE
            SYNTAX  InterfaceIndex
            MAX-ACCESS  read-only
            STATUS  current
            DESCRIPTION
                    "This object should be made equal to ifIndex.  The
                    next paragraph describes its previous usage.
                    Making the object equal to ifIndex allows propoer
                    use of ifStackTable.

                    Previously, this object was the identifier of a
                    DS3/E3 Interface on a managed device.  If there is
                    an ifEntry that is directly associated with this
                    and only this DS3/E3 interface, it should have the
                    same value as ifIndex.  Otherwise, number the
                    dsx3LineIndices with an unique identifier
                    following the rules of choosing a number that is
                    greater than ifNumber and numbering the inside
                    interfaces (e.g., equipment side) with even
```

                    numbers and outside interfaces (e.g, network side)
                    with odd numbers."
              ::= { dsx3ConfigEntry 1 }

        dsx3IfIndex OBJECT-TYPE
              SYNTAX InterfaceIndex
              MAX-ACCESS read-only
              STATUS deprecated
              DESCRIPTION
                    "This value for this object is equal to the value
                    of ifIndex from the Interfaces table of MIB II
                    (RFC 1213)."
              ::= { dsx3ConfigEntry 2 }

        dsx3TimeElapsed OBJECT-TYPE
              SYNTAX INTEGER (0..899)
              MAX-ACCESS read-only
              STATUS current
              DESCRIPTION
                    "The number of seconds that have elapsed since the
                    beginning of the near end current error-
                    measurement period. If, for some reason, such as
                    an adjustment in the system's time-of-day clock,
                    the current interval exceeds the maximum value,
                    the agent will return the maximum value."

              ::= { dsx3ConfigEntry 3 }

        dsx3ValidIntervals OBJECT-TYPE
              SYNTAX INTEGER (0..96)
              MAX-ACCESS read-only
              STATUS current
              DESCRIPTION
                    "The number of previous near end intervals for
                    which data was collected. The value will be
                    96 unless the interface was brought online within
                    the last 24 hours, in which case the value will be
                    the number of complete 15 minute near end
                    intervals since the interface has been online. In
                    the case where the agent is a proxy, it is
                    possible that some intervals are unavailable. In
                    this case, this interval is the maximum interval
                    number for which data is available."
              ::= { dsx3ConfigEntry 4 }

        dsx3LineType OBJECT-TYPE
              SYNTAX INTEGER {
                      dsx3other(1),

```
                        dsx3M23(2),
                        dsx3SYNTRAN(3),
                        dsx3CbitParity(4),
                        dsx3ClearChannel(5),
                        e3other(6),
                        e3Framed(7),
                        e3Plcp(8)
                    }
            MAX-ACCESS  read-write
            STATUS  current
            DESCRIPTION
                    "This variable indicates the variety of DS3 C-bit
                    or E3 application implementing this interface. The
                    type of interface affects the interpretation of
                    the usage and error statistics.  The rate of DS3
                    is 44.736 Mbps and E3 is 34.368 Mbps.  The
                    dsx3ClearChannel value means that the C-bits are
                    not used except for sending/receiving AIS.
                    The values, in sequence, describe:

                    TITLE:              SPECIFICATION:
                    dsx3M23             ANSI T1.107-1988 [9]
                    dsx3SYNTRAN         ANSI T1.107-1988 [9]
                    dsx3CbitParity      ANSI T1.107a-1990 [9a]
                    dsx3ClearChannel    ANSI T1.102-1987 [8]
                    e3Framed            CCITT G.751 [12]
                    e3Plcp              ETSI T/NA(91)18 [13]."
            ::= { dsx3ConfigEntry 5 }

        dsx3LineCoding OBJECT-TYPE
            SYNTAX  INTEGER {
                        dsx3Other(1),
                        dsx3B3ZS(2),
                        e3HDB3(3)
                    }
            MAX-ACCESS  read-write
            STATUS  current
            DESCRIPTION
                    "This variable describes the variety of Zero Code
                    Suppression used on this interface, which in turn
                    affects a number of its characteristics.

                    dsx3B3ZS and e3HDB3 refer to the use of specified
                    patterns of normal bits and bipolar violations
                    which are used to replace sequences of zero bits
                    of a specified length."
            ::= { dsx3ConfigEntry 6 }
```

          dsx3SendCode OBJECT-TYPE
              SYNTAX INTEGER {
                      dsx3SendNoCode(1),
                      dsx3SendLineCode(2),
                      dsx3SendPayloadCode(3),
                      dsx3SendResetCode(4),
                      dsx3SendDS1LoopCode(5),
                      dsx3SendTestPattern(6)
                      }
              MAX-ACCESS read-write
              STATUS current
              DESCRIPTION
                      "This variable indicates what type of code is
                      being sent across the DS3/E3 interface by the
                      device. (These are optional for E3 interfaces.)
                      Setting this variable causes the interface to
                      begin sending the code requested.
                      The values mean:

                          dsx3SendNoCode
                              sending looped or normal data

                          dsx3SendLineCode
                              sending a request for a line loopback

                          dsx3SendPayloadCode
                              sending a request for a payload loopback
                              (i.e., all DS1/E1s in a DS3/E3 frame)

                          dsx3SendResetCode
                              sending a loopback deactivation request

                          dsx3SendDS1LoopCode
                              requesting to loopback a particular DS1/E1
                              within a DS3/E3 frame. The DS1/E1 is
                              indicated in dsx3Ds1ForRemoteLoop.

                          dsx3SendTestPattern
                              sending a test pattern."
              ::= { dsx3ConfigEntry 7 }

      dsx3CircuitIdentifier OBJECT-TYPE
              SYNTAX DisplayString (SIZE (0..255))
              MAX-ACCESS read-write
              STATUS current
              DESCRIPTION
                      "This variable contains the transmission vendor's
                      circuit identifier, for the purpose of

                   facilitating troubleshooting."
              ::= { dsx3ConfigEntry 8 }

        dsx3LoopbackConfig OBJECT-TYPE
              SYNTAX   INTEGER {
                        dsx3NoLoop(1),
                        dsx3PayloadLoop(2),
                        dsx3LineLoop(3),
                        dsx3OtherLoop(4),
                        dsx3InwardLoop(5),
                        dsx3DualLoop(6)
                      }
              MAX-ACCESS   read-write
              STATUS   current
              DESCRIPTION
                    "This variable represents the desired loopback
                    configuration of the DS3/E3 interface.

                    The values mean:

                    dsx3NoLoop
                      Not in the loopback state. A device that is
                      not capable of performing a loopback on
                      the interface shall always return this as
                      its value.

                    dsx3PayloadLoop
                      The received signal at this interface is looped
                      through the device. Typically the received signal
                      is looped back for retransmission after it has
                      passed through the device's framing function.

                    dsx3LineLoop
                      The received signal at this interface does not
                      go through the device (minimum penetration) but
                      is looped back out.

                    dsx3OtherLoop
                      Loopbacks that are not defined here.

                    dsx3InwardLoop
                      The sent signal at this interface is looped back
                      through the device.

                    dsx3DualLoop
                      Both dsx1LineLoop and dsx1InwardLoop will be
                      active simultaneously."
              ::= { dsx3ConfigEntry 9 }

        dsx3LineStatus OBJECT-TYPE
            SYNTAX   INTEGER (1..4095)
            MAX-ACCESS   read-only
            STATUS   current
            DESCRIPTION
                    "This variable indicates the Line Status of the
                    interface. It contains loopback state information
                    and failure state information. The dsx3LineStatus
                    is a bit map represented as a sum, therefore, it
                    can represent multiple failures and a loopback
                    (see dsx3LoopbackConfig object for the type of
                    loopback) simultaneously. The dsx3NoAlarm must be
                    set if and only if no other flag is set.

                    If the dsx3loopbackState bit is set, the loopback
                    in effect can be determined from the
                    dsx3loopbackConfig object.
             The various bit positions are:
              1   dsx3NoAlarm   No alarm present
              2   dsx3RcvRAIFailure   Receiving Yellow/Remote
                                          Alarm Indication
              4   dsx3XmitRAIAlarm   Transmitting Yellow/Remote
                                          Alarm Indication
              8   dsx3RcvAIS   Receiving AIS failure state
             16   dsx3XmitAIS   Transmitting AIS
             32   dsx3LOF   Receiving LOF failure state
             64   dsx3LOS   Receiving LOS failure state
            128   dsx3LoopbackState   Looping the received signal
            256   dsx3RcvTestCode   Receiving a Test Pattern
            512   dsx3OtherFailure   any line status not defined
                                          here
           1024   dsx3UnavailSigState   Near End in Unavailable Signal
                                          State
           2048   dsx3NetEquipOOS   Carrier Equipment Out of Service"
            ::= { dsx3ConfigEntry 10 }

   dsx3TransmitClockSource OBJECT-TYPE
       SYNTAX   INTEGER {
               loopTiming(1),
               localTiming(2),
               throughTiming(3)
           }
       MAX-ACCESS   read-write
       STATUS   current
       DESCRIPTION
             "The source of Transmit Clock.

             loopTiming indicates that the recovered receive clock

             is used as the transmit clock.

             localTiming indicates that a local clock source is used
             or that an external clock is attached to the box
             containing the interface.

             throughTiming indicates that transmit clock is derived
             from the recovered receive clock of another DS3
             interface."
         ::= { dsx3ConfigEntry 11 }

     dsx3InvalidIntervals OBJECT-TYPE
         SYNTAX   INTEGER (0..96)
         MAX-ACCESS   read-only
         STATUS   current
         DESCRIPTION
                     "The number of intervals in the range from 0 to
             dsx3ValidIntervals for which no data is
             available. This object will typically be zero
             except in cases where the data for some intervals
             are not available (e.g., in proxy situations)."
         ::= { dsx3ConfigEntry 12 }

     dsx3LineLength OBJECT-TYPE
         SYNTAX   INTEGER (0..64000)
         UNITS "meters"
         MAX-ACCESS   read-write
         STATUS   current
         DESCRIPTION
                 "The length of the ds3 line in meters. This
                 object provides information for line build out
                 circuitry if it exists and can use this object to
                 adjust the line build out."
         ::= { dsx3ConfigEntry 13 }

     dsx3LineStatusLastChange OBJECT-TYPE
         SYNTAX   TimeStamp
         MAX-ACCESS   read-only
         STATUS   current
         DESCRIPTION
                 "The value of MIB II's sysUpTime object at the
                 time this DS3/E3 entered its current line status
                 state. If the current state was entered prior to
                 the last re-initialization of the proxy-agent,
                 then this object contains a zero value."
         ::= { dsx3ConfigEntry 14 }

     dsx3LineStatusChangeTrapEnable OBJECT-TYPE

```
        SYNTAX       INTEGER {
                     enabled(1),
                     disabled(2)
                 }
        MAX-ACCESS   read-write
        STATUS       current
        DESCRIPTION
               "Indicates whether dsx3LineStatusChange traps
               should be generated for this interface."
        DEFVAL { disabled }
        ::= { dsx3ConfigEntry 15 }

    dsx3LoopbackStatus  OBJECT-TYPE
        SYNTAX       INTEGER (1..127)
        MAX-ACCESS   read-only
        STATUS       current
        DESCRIPTION
               "This variable represents the current state of the
               loopback on the DS3 interface.  It contains
               information about loopbacks established by a
               manager and remotely from the far end.

               The dsx3LoopbackStatus is a bit map represented as
               a sum, therefore is can represent multiple
               loopbacks simultaneously.

               The various bit positions are:
                1  dsx3NoLoopback
                2  dsx3NearEndPayloadLoopback
                4  dsx3NearEndLineLoopback
                8  dsx3NearEndOtherLoopback
               16  dsx3NearEndInwardLoopback
               32  dsx3FarEndPayloadLoopback
               64  dsx3FarEndLineLoopback"

        ::= { dsx3ConfigEntry 16 }

    dsx3Channelization  OBJECT-TYPE
        SYNTAX       INTEGER {
                     disabled(1),
                     enabledDs1(2),
                     enabledDs2(3)
                 }
        MAX-ACCESS   read-write
        STATUS       current
        DESCRIPTION
               "Indicates whether this ds3/e3 is channelized or
               unchannelized.  The value of enabledDs1 indicates
```

                    that this is a DS3 channelized into DS1s. The
                    value of enabledDs3 indicated that this is a DS3
                    channelized into DS2s. Setting this object will
                    cause the creation or deletion of DS2 or DS1
                    entries in the ifTable. "
        ::= { dsx3ConfigEntry 17 }

        dsx3Ds1ForRemoteLoop OBJECT-TYPE
            SYNTAX   INTEGER (0..29)

            MAX-ACCESS read-write
            STATUS   current
            DESCRIPTION
                    "Indicates which ds1/e1 on this ds3/e3 will be
                    indicated in the remote ds1 loopback request. A
                    value of 0 means no DS1 will be looped. A value
                    of 29 means all ds1s/e1s will be looped."
        ::= { dsx3ConfigEntry 18 }

        -- the DS3/E3 Current Table

        dsx3CurrentTable OBJECT-TYPE
            SYNTAX SEQUENCE OF Dsx3CurrentEntry
            MAX-ACCESS not-accessible
            STATUS current
            DESCRIPTION
                    "The DS3/E3 current table contains various
                    statistics being collected for the current 15
                    minute interval."
            ::= { ds3 6 }

        dsx3CurrentEntry OBJECT-TYPE
            SYNTAX Dsx3CurrentEntry
            MAX-ACCESS not-accessible
            STATUS current
            DESCRIPTION
                    "An entry in the DS3/E3 Current table."
            INDEX   { dsx3CurrentIndex }
            ::= { dsx3CurrentTable 1 }

        Dsx3CurrentEntry ::=
            SEQUENCE {
                dsx3CurrentIndex   InterfaceIndex,
                dsx3CurrentPESs   PerfCurrentCount,
                dsx3CurrentPSESs   PerfCurrentCount,
                dsx3CurrentSEFSs   PerfCurrentCount,

```
            dsx3CurrentUASs                 PerfCurrentCount,
            dsx3CurrentLCVs                 PerfCurrentCount,
            dsx3CurrentPCVs                 PerfCurrentCount,
            dsx3CurrentLESs                 PerfCurrentCount,
            dsx3CurrentCCVs                 PerfCurrentCount,
            dsx3CurrentCESs                 PerfCurrentCount,
            dsx3CurrentCSESs                PerfCurrentCount
        }

    dsx3CurrentIndex OBJECT-TYPE
        SYNTAX   InterfaceIndex
        MAX-ACCESS  read-only
        STATUS  current
        DESCRIPTION
                "The index value which uniquely identifies the
                DS3/E3 interface to which this entry is
                applicable.  The interface identified by a
                particular value of this index is the same
                interface as identified by the same value an
                dsx3LineIndex object instance."
        ::= { dsx3CurrentEntry 1 }

    dsx3CurrentPESs OBJECT-TYPE
        SYNTAX   PerfCurrentCount
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
                "The counter associated with the number of P-bit
                Errored Seconds."
        ::= { dsx3CurrentEntry 2 }

    dsx3CurrentPSESs OBJECT-TYPE
        SYNTAX   PerfCurrentCount
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
                "The counter associated with the number of P-bit
                Severely Errored Seconds."
        ::= { dsx3CurrentEntry 3 }

    dsx3CurrentSEFSs OBJECT-TYPE
        SYNTAX   PerfCurrentCount
        MAX-ACCESS  read-only
        STATUS   current
        DESCRIPTION
                "The counter associated with the number of
                Severely Errored Framing Seconds."
        ::= { dsx3CurrentEntry 4 }
```

        dsx3CurrentUASs OBJECT-TYPE
             SYNTAX   PerfCurrentCount
             MAX-ACCESS   read-only
             STATUS   current
             DESCRIPTION
                    "The counter associated with the number of
                     Unavailable Seconds."
             ::= { dsx3CurrentEntry 5 }

        dsx3CurrentLCVs OBJECT-TYPE
             SYNTAX   PerfCurrentCount
             MAX-ACCESS   read-only
             STATUS   current
             DESCRIPTION
                    "The counter associated with the number of Line
                     Coding Violations."
             ::= { dsx3CurrentEntry 6 }

        dsx3CurrentPCVs OBJECT-TYPE
             SYNTAX   PerfCurrentCount
             MAX-ACCESS   read-only
             STATUS   current
             DESCRIPTION
                    "The counter associated with the number of P-bit
                     Coding Violations."
             ::= { dsx3CurrentEntry 7 }

        dsx3CurrentLESs OBJECT-TYPE
             SYNTAX   PerfCurrentCount
             MAX-ACCESS   read-only
             STATUS   current
             DESCRIPTION
                    "The number of Line Errored Seconds."
             ::= { dsx3CurrentEntry 8 }

        dsx3CurrentCCVs OBJECT-TYPE
             SYNTAX   PerfCurrentCount
             MAX-ACCESS   read-only
             STATUS   current
             DESCRIPTION
                    "The number of C-bit Coding Violations."
             ::= { dsx3CurrentEntry 9 }

        dsx3CurrentCESs OBJECT-TYPE
             SYNTAX   PerfCurrentCount
             MAX-ACCESS   read-only
             STATUS   current
             DESCRIPTION

```
                    "The number of C-bit Errored Seconds."
          ::= { dsx3CurrentEntry 10 }

     dsx3CurrentCSESs OBJECT-TYPE
          SYNTAX  PerfCurrentCount
          MAX-ACCESS  read-only
          STATUS  current
          DESCRIPTION
                  "The number of C-bit Severely Errored Seconds."
          ::= { dsx3CurrentEntry 11 }

     -- the DS3/E3 Interval Table

     dsx3IntervalTable OBJECT-TYPE
          SYNTAX  SEQUENCE OF Dsx3IntervalEntry
          MAX-ACCESS  not-accessible
          STATUS  current
          DESCRIPTION
                  "The DS3/E3 Interval Table contains various
                  statistics collected by each DS3/E3 Interface over
                  the previous 24 hours of operation.  The past 24
                  hours are broken into 96 completed 15 minute
                  intervals.  Each row in this table represents one
                  such interval (identified by dsx3IntervalNumber)
                  and for one specific interface (identifed by
                  dsx3IntervalIndex)."

          ::= { ds3 7 }

     dsx3IntervalEntry OBJECT-TYPE
          SYNTAX  Dsx3IntervalEntry
          MAX-ACCESS  not-accessible
          STATUS  current
          DESCRIPTION
                  "An entry in the DS3/E3 Interval table."
          INDEX   { dsx3IntervalIndex, dsx3IntervalNumber }
          ::= { dsx3IntervalTable 1 }

     Dsx3IntervalEntry ::=
          SEQUENCE {
              dsx3IntervalIndex             InterfaceIndex,
              dsx3IntervalNumber            INTEGER,
              dsx3IntervalPESs              PerfIntervalCount,
              dsx3IntervalPSESs             PerfIntervalCount,
              dsx3IntervalSEFSs             PerfIntervalCount,
              dsx3IntervalUASs              PerfIntervalCount,
              dsx3IntervalLCVs              PerfIntervalCount,
              dsx3IntervalPCVs              PerfIntervalCount,
```

```
                dsx3IntervalLESs             PerfIntervalCount,
                dsx3IntervalCCVs             PerfIntervalCount,
                dsx3IntervalCESs             PerfIntervalCount,
                dsx3IntervalCSESs            PerfIntervalCount,
                dsx3IntervalValidData        TruthValue
            }

     dsx3IntervalIndex OBJECT-TYPE
          SYNTAX   InterfaceIndex
          MAX-ACCESS   read-only
          STATUS   current
          DESCRIPTION
                 "The index value which uniquely identifies the
                 DS3/E3 interface to which this entry is
                 applicable.  The interface identified by a
                 particular value of this index is the same
                 interface as identified by the same value an
                 dsx3LineIndex object instance."
          ::= { dsx3IntervalEntry 1 }

     dsx3IntervalNumber OBJECT-TYPE
          SYNTAX   INTEGER (1..96)
          MAX-ACCESS   read-only
          STATUS   current
          DESCRIPTION
                 "A number between 1 and 96, where 1 is the most
                 recently completed 15 minute interval and 96 is
                 the 15 minutes interval completed 23 hours and 45
                 minutes prior to interval 1."
          ::= { dsx3IntervalEntry 2 }

     dsx3IntervalPESs OBJECT-TYPE
          SYNTAX   PerfIntervalCount
          MAX-ACCESS   read-only
          STATUS   current
          DESCRIPTION
                 "The counter associated with the number of P-bit
                 Errored Seconds."
          ::= { dsx3IntervalEntry 3 }

     dsx3IntervalPSESs OBJECT-TYPE
          SYNTAX   PerfIntervalCount
          MAX-ACCESS   read-only
          STATUS   current
          DESCRIPTION
                 "The counter associated with the number of P-bit
                 Severely Errored Seconds."
          ::= { dsx3IntervalEntry 4 }
```

```
   dsx3IntervalSEFSs OBJECT-TYPE
       SYNTAX  PerfIntervalCount
       MAX-ACCESS  read-only
       STATUS  current
       DESCRIPTION
             "The counter associated with the number of
             Severely Errored Framing Seconds."
       ::= { dsx3IntervalEntry 5 }

   dsx3IntervalUASs OBJECT-TYPE
       SYNTAX  PerfIntervalCount
       MAX-ACCESS  read-only
       STATUS  current
       DESCRIPTION
             "The counter associated with the number of
             Unavailable Seconds.  This object may decrease if
             the occurance of unavailable seconds occurs across
             an inteval boundary."
       ::= { dsx3IntervalEntry 6 }

   dsx3IntervalLCVs OBJECT-TYPE
       SYNTAX  PerfIntervalCount
       MAX-ACCESS  read-only
       STATUS  current
       DESCRIPTION
             "The counter associated with the number of Line
             Coding Violations."
       ::= { dsx3IntervalEntry 7 }

   dsx3IntervalPCVs OBJECT-TYPE
       SYNTAX  PerfIntervalCount
       MAX-ACCESS  read-only
       STATUS  current
       DESCRIPTION
             "The counter associated with the number of P-bit
             Coding Violations."
       ::= { dsx3IntervalEntry 8 }

   dsx3IntervalLESs OBJECT-TYPE
       SYNTAX  PerfIntervalCount
       MAX-ACCESS  read-only
       STATUS  current
       DESCRIPTION
             "The number of Line Errored  Seconds  (BPVs  or
             illegal  zero  sequences)."
       ::= { dsx3IntervalEntry 9 }

   dsx3IntervalCCVs OBJECT-TYPE
```

```
          SYNTAX  PerfIntervalCount
          MAX-ACCESS  read-only
          STATUS  current
          DESCRIPTION
                "The number of C-bit Coding Violations."
          ::= { dsx3IntervalEntry 10 }

     dsx3IntervalCESs OBJECT-TYPE
          SYNTAX  PerfIntervalCount
          MAX-ACCESS  read-only
          STATUS  current
          DESCRIPTION
                "The number of C-bit Errored Seconds."
          ::= { dsx3IntervalEntry 11 }

     dsx3IntervalCSESs OBJECT-TYPE
          SYNTAX  PerfIntervalCount
          MAX-ACCESS  read-only
          STATUS  current
          DESCRIPTION
                "The number of C-bit Severely Errored Seconds."
          ::= { dsx3IntervalEntry 12 }

     dsx3IntervalValidData OBJECT-TYPE
          SYNTAX  TruthValue
          MAX-ACCESS read-only
          STATUS current
          DESCRIPTION
                "This variable indicates if the data for this
                interval is valid."
          ::= { dsx3IntervalEntry 13 }

     -- the DS3/E3 Total

     dsx3TotalTable OBJECT-TYPE
          SYNTAX  SEQUENCE OF Dsx3TotalEntry
          MAX-ACCESS  not-accessible
          STATUS  current
          DESCRIPTION
                "The DS3/E3 Total Table contains the cumulative
                sum of the various statistics for the 24 hour
                period preceding the current interval."
          ::= { ds3 8 }

     dsx3TotalEntry OBJECT-TYPE
          SYNTAX  Dsx3TotalEntry
          MAX-ACCESS  not-accessible
          STATUS  current
```

```
         DESCRIPTION
                 "An entry in the DS3/E3 Total table."
          INDEX   { dsx3TotalIndex }
           ::= { dsx3TotalTable 1 }

      Dsx3TotalEntry ::=
          SEQUENCE {
              dsx3TotalIndex        InterfaceIndex,
              dsx3TotalPESs         PerfTotalCount,
              dsx3TotalPSESs        PerfTotalCount,
              dsx3TotalSEFSs        PerfTotalCount,
              dsx3TotalUASs         PerfTotalCount,
              dsx3TotalLCVs         PerfTotalCount,
              dsx3TotalPCVs         PerfTotalCount,
              dsx3TotalLESs         PerfTotalCount,
              dsx3TotalCCVs         PerfTotalCount,
              dsx3TotalCESs         PerfTotalCount,
              dsx3TotalCSESs        PerfTotalCount
          }

      dsx3TotalIndex OBJECT-TYPE
          SYNTAX  InterfaceIndex
          MAX-ACCESS  read-only
          STATUS  current
          DESCRIPTION
                 "The index value which uniquely identifies the
                 DS3/E3 interface to which this entry is
                 applicable.  The interface identified by a
                 particular value of this index is the same
                 interface as identified by the same value an
                 dsx3LineIndex object instance."
          ::= { dsx3TotalEntry 1 }

      dsx3TotalPESs OBJECT-TYPE
          SYNTAX  PerfTotalCount
          MAX-ACCESS  read-only
          STATUS  current
          DESCRIPTION
                 "The counter associated with the number of P-bit
                 Errored Seconds, encountered by a DS3 interface in
                 the previous 24 hour interval. Invalid 15 minute
                 intervals count as 0."
          ::= { dsx3TotalEntry 2 }

      dsx3TotalPSESs OBJECT-TYPE
          SYNTAX  PerfTotalCount
          MAX-ACCESS  read-only
          STATUS  current
```

```
        DESCRIPTION
                "The counter associated with the number of P-bit
                Severely Errored Seconds, encountered by a DS3
                interface in the previous 24 hour interval.
                Invalid 15 minute intervals count as 0."
        ::= { dsx3TotalEntry 3 }

    dsx3TotalSEFSs OBJECT-TYPE
        SYNTAX  PerfTotalCount
        MAX-ACCESS  read-only
        STATUS  current
        DESCRIPTION
                "The counter associated with the number of
                Severely Errored Framing Seconds, encountered by a
                DS3/E3 interface in the previous 24 hour interval.
                Invalid 15 minute intervals count as 0."
        ::= { dsx3TotalEntry 4 }

    dsx3TotalUASs OBJECT-TYPE
        SYNTAX  PerfTotalCount
        MAX-ACCESS  read-only
        STATUS  current
        DESCRIPTION
                "The counter associated with the number of
                Unavailable Seconds, encountered by a DS3
                interface in the previous 24 hour interval.

                Invalid 15 minute intervals count as 0."
        ::= { dsx3TotalEntry 5 }

    dsx3TotalLCVs OBJECT-TYPE
        SYNTAX  PerfTotalCount
        MAX-ACCESS  read-only
        STATUS  current
        DESCRIPTION
                "The counter associated with the number of Line
                Coding Violations encountered by a DS3/E3
                interface in the previous 24 hour interval.
                Invalid 15 minute intervals count as 0."
        ::= { dsx3TotalEntry 6 }

    dsx3TotalPCVs OBJECT-TYPE
        SYNTAX  PerfTotalCount
        MAX-ACCESS  read-only
        STATUS  current
        DESCRIPTION
                "The counter associated with the number of P-bit
                Coding Violations, encountered by a DS3 interface
```

                    in the previous 24 hour interval. Invalid 15
                    minute intervals count as 0."
              ::= { dsx3TotalEntry 7 }

        dsx3TotalLESs OBJECT-TYPE
            SYNTAX PerfTotalCount
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
                    "The number of Line Errored Seconds (BPVs or
                    illegal zero sequences) encountered by a DS3/E3
                    interface in the previous 24 hour interval.
                    Invalid 15 minute intervals count as 0."
              ::= { dsx3TotalEntry 8 }

        dsx3TotalCCVs OBJECT-TYPE
            SYNTAX PerfTotalCount
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
                    "The number of C-bit Coding Violations encountered
                    by a DS3 interface in the previous 24 hour
                    interval. Invalid 15 minute intervals count as 0."
              ::= { dsx3TotalEntry 9 }

        dsx3TotalCESs OBJECT-TYPE
            SYNTAX PerfTotalCount
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
                    "The number of C-bit Errored Seconds encountered
                    by a DS3 interface in the previous 24 hour
                    interval. Invalid 15 minute intervals count as 0."
              ::= { dsx3TotalEntry 10 }

        dsx3TotalCSESs OBJECT-TYPE
            SYNTAX PerfTotalCount
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
                    "The number of C-bit Severely Errored Seconds
                    encountered by a DS3 interface in the previous 24
                    hour interval. Invalid 15 minute intervals count
                    as 0."
              ::= { dsx3TotalEntry 11 }

        -- The DS3 Far End Group

```
     -- The DS3 Far End Group consists of four tables :
     --   DS3 Far End Configuration
     --   DS3 Far End Current
     --   DS3 Far End Interval
     --   DS3 Far End Total



     -- The DS3 Far End Configuration Table

     dsx3FarEndConfigTable OBJECT-TYPE
         SYNTAX   SEQUENCE OF Dsx3FarEndConfigEntry
         MAX-ACCESS  not-accessible
         STATUS  current
         DESCRIPTION
                 "The DS3 Far End Configuration Table contains
                 configuration information reported in the C-bits
                 from the remote end."
         ::= { ds3 9 }

     dsx3FarEndConfigEntry OBJECT-TYPE
         SYNTAX  Dsx3FarEndConfigEntry
         MAX-ACCESS  not-accessible
         STATUS   current
         DESCRIPTION
                 "An entry in the DS3 Far End Configuration table."
         INDEX   { dsx3FarEndLineIndex }
          ::= { dsx3FarEndConfigTable 1 }

     Dsx3FarEndConfigEntry ::=
         SEQUENCE {
             dsx3FarEndLineIndex            InterfaceIndex,
             dsx3FarEndEquipCode            DisplayString,
             dsx3FarEndLocationIDCode       DisplayString,
             dsx3FarEndFrameIDCode          DisplayString,
             dsx3FarEndUnitCode             DisplayString,
             dsx3FarEndFacilityIDCode       DisplayString
         }

     dsx3FarEndLineIndex OBJECT-TYPE
         SYNTAX  InterfaceIndex
         MAX-ACCESS  read-only
         STATUS  current
         DESCRIPTION
                 "The index value which uniquely identifies the DS3
                 interface to which this entry is applicable.  The
                 interface identified by a particular value of this
                 index is the same interface as identified by the
                 same value an dsx3LineIndex object instance."
```

```
        ::= { dsx3FarEndConfigEntry 1 }

dsx3FarEndEquipCode OBJECT-TYPE
    SYNTAX  DisplayString (SIZE (0..10))
    MAX-ACCESS  read-write
    STATUS  current
    DESCRIPTION
            "This is the Far End Equipment Identification code
            that describes the specific piece of equipment.
            It is sent within the Path Identification
            Message."
    ::= { dsx3FarEndConfigEntry 2 }

dsx3FarEndLocationIDCode OBJECT-TYPE
    SYNTAX  DisplayString (SIZE (0..11))
    MAX-ACCESS  read-write
    STATUS  current
    DESCRIPTION
            "This is the Far End Location Identification code
            that describes the specific location of the
            equipment.  It is sent within the Path
            Identification Message."
    ::= { dsx3FarEndConfigEntry 3 }

dsx3FarEndFrameIDCode OBJECT-TYPE
    SYNTAX  DisplayString (SIZE (0..10))
    MAX-ACCESS  read-write
    STATUS  current
    DESCRIPTION
            "This is the Far End Frame Identification code
            that identifies where the equipment is located
            within a building at a given location.  It is sent
            within the Path Identification Message."
    ::= { dsx3FarEndConfigEntry 4 }

dsx3FarEndUnitCode OBJECT-TYPE
    SYNTAX  DisplayString (SIZE (0..6))
    MAX-ACCESS  read-write
    STATUS  current
    DESCRIPTION
            "This is the Far End code that identifies the
            equipment location within a bay.  It is sent
            within the Path Identification Message."
    ::= { dsx3FarEndConfigEntry 5 }

dsx3FarEndFacilityIDCode OBJECT-TYPE
    SYNTAX  DisplayString (SIZE (0..38))
    MAX-ACCESS  read-write
```

```
        STATUS  current
        DESCRIPTION
              "This code identifies a specific Far End DS3 path.
               It is sent within the Path Identification
               Message."
        ::= { dsx3FarEndConfigEntry 6 }

  -- The DS3 Far End Current

    dsx3FarEndCurrentTable OBJECT-TYPE
        SYNTAX   SEQUENCE OF Dsx3FarEndCurrentEntry
        MAX-ACCESS  not-accessible
        STATUS  current
        DESCRIPTION
              "The DS3 Far End Current table contains various
               statistics being collected for the current 15
               minute interval.  The statistics are collected
               from the far end block error code within the C-
               bits."
        ::= { ds3 10 }

    dsx3FarEndCurrentEntry OBJECT-TYPE
        SYNTAX   Dsx3FarEndCurrentEntry
        MAX-ACCESS  not-accessible
        STATUS  current
        DESCRIPTION
              "An entry in the DS3 Far End Current table."
        INDEX   { dsx3FarEndCurrentIndex }
        ::= { dsx3FarEndCurrentTable 1 }

    Dsx3FarEndCurrentEntry ::=
        SEQUENCE {
            dsx3FarEndCurrentIndex          InterfaceIndex,
            dsx3FarEndTimeElapsed           INTEGER,
            dsx3FarEndValidIntervals        INTEGER,
            dsx3FarEndCurrentCESs           PerfCurrentCount,
            dsx3FarEndCurrentCSESs          PerfCurrentCount,
            dsx3FarEndCurrentCCVs           PerfCurrentCount,
            dsx3FarEndCurrentUASs           PerfCurrentCount,
            dsx3FarEndInvalidIntervals      INTEGER
        }

     dsx3FarEndCurrentIndex OBJECT-TYPE
        SYNTAX   InterfaceIndex
        MAX-ACCESS  read-only
        STATUS  current
        DESCRIPTION
              "The index value which uniquely identifies the DS3
```

```
                 interface to which this entry is applicable.  The
                 interface identified by a particular value of this
                 index is identical to the interface identified by
                 the same value of dsx3LineIndex."
          ::= { dsx3FarEndCurrentEntry 1 }

     dsx3FarEndTimeElapsed OBJECT-TYPE
          SYNTAX   INTEGER (0..899)
          MAX-ACCESS  read-only
          STATUS   current
          DESCRIPTION
                 "The number of seconds that have elapsed since the
                 beginning of the far end current error-measurement
                 period.  If, for some reason, such as an
                 adjustment in the system's time-of-day clock, the
                 current interval exceeds the maximum value, the
                 agent will return the maximum value."
          ::= { dsx3FarEndCurrentEntry 2 }

     dsx3FarEndValidIntervals OBJECT-TYPE
          SYNTAX   INTEGER (0..96)
          MAX-ACCESS  read-only
          STATUS   current
          DESCRIPTION
                 "The number of previous far end intervals for
                 which data was collected.  The value will be
                 96 unless the interface was brought online within
                 the last 24 hours, in which case the value will be
                 the number of complete 15 minute far end intervals
                 since the interface has been online."
          ::= { dsx3FarEndCurrentEntry 3 }

     dsx3FarEndCurrentCESs OBJECT-TYPE
          SYNTAX   PerfCurrentCount
          MAX-ACCESS  read-only
          STATUS   current
          DESCRIPTION
                 "The counter associated with the number of Far Far
                 End C-bit Errored Seconds."
          ::= { dsx3FarEndCurrentEntry 4 }

     dsx3FarEndCurrentCSESs OBJECT-TYPE
          SYNTAX   PerfCurrentCount
          MAX-ACCESS  read-only
          STATUS   current
          DESCRIPTION
                 "The counter associated with the number of Far End
                 C-bit Severely Errored Seconds."
```

```
                  ::= { dsx3FarEndCurrentEntry 5 }

      dsx3FarEndCurrentCCVs OBJECT-TYPE
          SYNTAX  PerfCurrentCount
          MAX-ACCESS  read-only
          STATUS  current
          DESCRIPTION
                  "The counter associated with the number of Far End
                  C-bit Coding Violations reported via the far end
                  block error count."
          ::= { dsx3FarEndCurrentEntry 6 }

      dsx3FarEndCurrentUASs OBJECT-TYPE
          SYNTAX  PerfCurrentCount
          MAX-ACCESS  read-only
          STATUS  current
          DESCRIPTION
                  "The counter associated with the number of Far End
                  unavailable seconds."
          ::= { dsx3FarEndCurrentEntry 7 }

      dsx3FarEndInvalidIntervals OBJECT-TYPE
          SYNTAX   INTEGER (0..96)
          MAX-ACCESS  read-only
          STATUS  current
          DESCRIPTION
                  "The number of intervals in the range from 0 to
                  dsx3FarEndValidIntervals for which no data is
                  available.  This object will typically be zero
                  except in cases where the data for some intervals
                  are not available (e.g., in proxy situations)."
          ::= { dsx3FarEndCurrentEntry 8 }

      -- The DS3 Far End Interval Table

      dsx3FarEndIntervalTable OBJECT-TYPE
          SYNTAX  SEQUENCE OF Dsx3FarEndIntervalEntry
          MAX-ACCESS  not-accessible
          STATUS  current
          DESCRIPTION
                  "The DS3 Far End Interval Table contains various
                  statistics collected by each DS3 interface over
                  the previous 24 hours of operation.  The past 24
                  hours are broken into 96 completed 15 minute
                  intervals."
          ::= { ds3 11 }

      dsx3FarEndIntervalEntry OBJECT-TYPE
```

```
        SYNTAX  Dsx3FarEndIntervalEntry
        MAX-ACCESS  not-accessible
        STATUS  current
        DESCRIPTION
              "An entry in the DS3 Far End Interval table."
        INDEX   { dsx3FarEndIntervalIndex,
                  dsx3FarEndIntervalNumber }
        ::= { dsx3FarEndIntervalTable 1 }

   Dsx3FarEndIntervalEntry ::=
        SEQUENCE {
             dsx3FarEndIntervalIndex       InterfaceIndex,
             dsx3FarEndIntervalNumber      INTEGER,
             dsx3FarEndIntervalCESs        PerfIntervalCount,
             dsx3FarEndIntervalCSESs       PerfIntervalCount,
             dsx3FarEndIntervalCCVs        PerfIntervalCount,
             dsx3FarEndIntervalUASs        PerfIntervalCount,
             dsx3FarEndIntervalValidData   TruthValue
        }

   dsx3FarEndIntervalIndex OBJECT-TYPE
        SYNTAX  InterfaceIndex
        MAX-ACCESS  read-only
        STATUS  current
        DESCRIPTION
              "The index value which uniquely identifies the DS3
              interface to which this entry is applicable.  The
              interface identified by a particular value of this
              index is identical to the interface identified by
              the same value of dsx3LineIndex."
        ::= { dsx3FarEndIntervalEntry 1 }

   dsx3FarEndIntervalNumber OBJECT-TYPE
        SYNTAX  INTEGER (1..96)
        MAX-ACCESS  read-only
        STATUS  current
        DESCRIPTION
              "A number between 1 and 96, where 1 is the most
              recently completed 15 minute interval and 96 is
              the 15 minutes interval completed 23 hours and 45
              minutes prior to interval 1."
        ::= { dsx3FarEndIntervalEntry 2 }

   dsx3FarEndIntervalCESs OBJECT-TYPE
        SYNTAX  PerfIntervalCount
        MAX-ACCESS  read-only
        STATUS  current
        DESCRIPTION
```

                        "The counter associated with the number of Far End
                        C-bit Errored Seconds encountered by a DS3
                        interface in one of the previous 96, individual 15
                        minute, intervals. In the case where the agent is
                        a proxy and data is not available, return
                        noSuchInstance."
                  ::= { dsx3FarEndIntervalEntry 3 }

           dsx3FarEndIntervalCSESs OBJECT-TYPE
                SYNTAX   PerfIntervalCount
                MAX-ACCESS   read-only
                STATUS   current
                DESCRIPTION
                        "The counter associated with the number of Far End
                        C-bit Severely Errored Seconds."
                  ::= { dsx3FarEndIntervalEntry 4 }

           dsx3FarEndIntervalCCVs OBJECT-TYPE
                SYNTAX   PerfIntervalCount
                MAX-ACCESS   read-only
                STATUS   current
                DESCRIPTION
                        "The counter associated with the number of Far End
                        C-bit Coding Violations reported via the far end
                        block error count."
                  ::= { dsx3FarEndIntervalEntry 5 }

           dsx3FarEndIntervalUASs OBJECT-TYPE
                SYNTAX   PerfIntervalCount
                MAX-ACCESS   read-only
                STATUS   current
                DESCRIPTION
                        "The counter associated with the number of Far End
                        unavailable seconds."
                  ::= { dsx3FarEndIntervalEntry 6 }

           dsx3FarEndIntervalValidData OBJECT-TYPE
                SYNTAX   TruthValue
                MAX-ACCESS   read-only
                STATUS   current
                DESCRIPTION
                        "This variable indicates if the data for this
                        interval is valid."
                  ::= { dsx3FarEndIntervalEntry 7 }

           -- The DS3 Far End Total

        dsx3FarEndTotalTable OBJECT-TYPE
             SYNTAX   SEQUENCE OF Dsx3FarEndTotalEntry
             MAX-ACCESS not-accessible
             STATUS current
             DESCRIPTION
                     "The DS3 Far End Total Table contains the
                     cumulative sum of the various statistics for the
                     24 hour period preceding the current interval."
             ::= { ds3 12 }

        dsx3FarEndTotalEntry OBJECT-TYPE
             SYNTAX Dsx3FarEndTotalEntry
             MAX-ACCESS not-accessible
             STATUS current
             DESCRIPTION
                     "An entry in the DS3 Far End Total table."
             INDEX   { dsx3FarEndTotalIndex }
             ::= { dsx3FarEndTotalTable 1 }

        Dsx3FarEndTotalEntry ::=
             SEQUENCE {
                 dsx3FarEndTotalIndex   InterfaceIndex,
                 dsx3FarEndTotalCESs   PerfTotalCount,
                 dsx3FarEndTotalCSESs   PerfTotalCount,
                 dsx3FarEndTotalCCVs   PerfTotalCount,
                 dsx3FarEndTotalUASs   PerfTotalCount
             }

        dsx3FarEndTotalIndex OBJECT-TYPE
             SYNTAX   InterfaceIndex
             MAX-ACCESS read-only
             STATUS current
             DESCRIPTION
                     "The index value which uniquely identifies the DS3
                     interface to which this entry is applicable. The
                     interface identified by a particular value of this
                     index is identical to the interface identified by
                     the same value of dsx3LineIndex."
             ::= { dsx3FarEndTotalEntry 1 }

        dsx3FarEndTotalCESs OBJECT-TYPE
            SYNTAX PerfTotalCount
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
                    "The counter associated with the number of Far End
                    C-bit Errored Seconds encountered by a DS3
                    interface in the previous 24 hour interval.

```
                 Invalid 15 minute intervals count as 0."
            ::= { dsx3FarEndTotalEntry 2 }

        dsx3FarEndTotalCSESs OBJECT-TYPE
            SYNTAX  PerfTotalCount
            MAX-ACCESS  read-only
            STATUS  current
            DESCRIPTION
                    "The counter associated with the number of Far End
                    C-bit Severely Errored Seconds encountered by a
                    DS3 interface in the previous 24 hour interval.
                    Invalid 15 minute intervals count as 0."
            ::= { dsx3FarEndTotalEntry 3 }

        dsx3FarEndTotalCCVs OBJECT-TYPE
            SYNTAX  PerfTotalCount
            MAX-ACCESS  read-only
            STATUS  current
            DESCRIPTION
                    "The counter associated with the number of Far End
                    C-bit Coding Violations reported via the far end
                    block error count encountered by a DS3 interface
                    in the previous 24 hour interval. Invalid 15
                    minute intervals count as 0."
            ::= { dsx3FarEndTotalEntry 4 }

        dsx3FarEndTotalUASs OBJECT-TYPE
            SYNTAX  PerfTotalCount
            MAX-ACCESS  read-only
            STATUS  current
            DESCRIPTION
                    "The counter associated with the number of Far End
                    unavailable seconds encountered by a DS3 interface
                    in the previous 24 hour interval.  Invalid 15
                    minute intervals count as 0."
            ::= { dsx3FarEndTotalEntry 5 }


        -- the DS3/E3 Fractional Table

        -- This table is deprecated.

        dsx3FracTable OBJECT-TYPE
            SYNTAX   SEQUENCE OF Dsx3FracEntry
            MAX-ACCESS  not-accessible
            STATUS  deprecated
            DESCRIPTION
                    "This table is deprecated in favour of using
```

                    ifStackTable.

                    Implementation of this table was optional. It was
                    designed for those systems dividing a DS3/E3 into
                    channels containing different data streams that
                    are of local interest.

                    The DS3/E3 fractional table identifies which
                    DS3/E3 channels associated with a CSU are being
                    used to support a logical interface, i.e., an
                    entry in the interfaces table from the Internet-
                    standard MIB.

                    For example, consider a DS3 device with 4 high
                    speed links carrying router traffic, a feed for
                    voice, a feed for video, and a synchronous channel
                    for a non-routed protocol. We might describe the
                    allocation of channels, in the dsx3FracTable, as
                    follows:
                    dsx3FracIfIndex.2. 1 = 3 dsx3FracIfIndex.2.15 = 4
                    dsx3FracIfIndex.2. 2 = 3 dsx3FracIfIndex.2.16 = 6
                    dsx3FracIfIndex.2. 3 = 3 dsx3FracIfIndex.2.17 = 6
                    dsx3FracIfIndex.2. 4 = 3 dsx3FracIfIndex.2.18 = 6
                    dsx3FracIfIndex.2. 5 = 3 dsx3FracIfIndex.2.19 = 6
                    dsx3FracIfIndex.2. 6 = 3 dsx3FracIfIndex.2.20 = 6
                    dsx3FracIfIndex.2. 7 = 4 dsx3FracIfIndex.2.21 = 6
                    dsx3FracIfIndex.2. 8 = 4 dsx3FracIfIndex.2.22 = 6
                    dsx3FracIfIndex.2. 9 = 4 dsx3FracIfIndex.2.23 = 6
                    dsx3FracIfIndex.2.10 = 4 dsx3FracIfIndex.2.24 = 6
                    dsx3FracIfIndex.2.11 = 4 dsx3FracIfIndex.2.25 = 6
                    dsx3FracIfIndex.2.12 = 5 dsx3FracIfIndex.2.26 = 6
                    dsx3FracIfIndex.2.13 = 5 dsx3FracIfIndex.2.27 = 6
                    dsx3FracIfIndex.2.14 = 5 dsx3FracIfIndex.2.28 = 6
                    For dsx3M23, dsx3 SYNTRAN, dsx3CbitParity, and
                    dsx3ClearChannel there are 28 legal channels,
                    numbered 1 throug h 28.

                    For e3Framed there are 16 legal channels, numbered
                    1 through 16. The channels (1..16) correspond
                    directly to the equivalently numbered time-slots."
               ::= { ds3 13 }

         dsx3FracEntry OBJECT-TYPE
             SYNTAX Dsx3FracEntry
             MAX-ACCESS not-accessible
             STATUS deprecated
             DESCRIPTION
                        "An entry in the DS3 Fractional table."

```
        INDEX    { dsx3FracIndex, dsx3FracNumber }
        ::= { dsx3FracTable 1 }


    Dsx3FracEntry ::=
         SEQUENCE {
             dsx3FracIndex      INTEGER,
             dsx3FracNumber     INTEGER,
             dsx3FracIfIndex    INTEGER
         }


    dsx3FracIndex OBJECT-TYPE
        SYNTAX   INTEGER (1..'7fffffff'h)
        MAX-ACCESS  read-only
        STATUS   deprecated
        DESCRIPTION
                "The index value which uniquely identifies  the
                DS3  interface  to which this entry is applicable
                The interface identified by a  particular value
                of  this  index is the same interface as
                identified by the same value  an  dsx3LineIndex
                object instance."
        ::= { dsx3FracEntry 1 }

    dsx3FracNumber OBJECT-TYPE
        SYNTAX   INTEGER (1..31)
        MAX-ACCESS  read-only
        STATUS   deprecated
        DESCRIPTION
                "The channel number for this entry."
        ::= { dsx3FracEntry 2 }

    dsx3FracIfIndex OBJECT-TYPE
        SYNTAX   INTEGER (1..'7fffffff'h)
        MAX-ACCESS  read-write
        STATUS   deprecated
        DESCRIPTION
                "An index value that uniquely identifies an
                interface.  The interface identified by a
                particular value of this index is the same
                interface as  identified by the same value an
                ifIndex object instance. If no interface is
                currently using a channel, the value should be
                zero.  If a single interface occupies more  than
                one  time slot,  that ifIndex value will be found
                in multiple time slots."
        ::= { dsx3FracEntry 3 }
```

```
    -- Ds3 TRAPS

  ds3Traps OBJECT IDENTIFIER ::= { ds3 15 }



  dsx3LineStatusChange NOTIFICATION-TYPE
      OBJECTS { dsx3LineStatus,
                dsx3LineStatusLastChange }
      STATUS   current
      DESCRIPTION
              "A dsx3LineStatusChange trap is sent when the
              value of an instance of dsx3LineStatus changes. It
              can be utilized by an NMS to trigger polls.  When
              the line status change results in a lower level
              line status change (i.e. ds1), then no traps for
              the lower level are sent."
                 ::= { ds3Traps 0 1 }


              -- conformance information

              ds3Conformance OBJECT IDENTIFIER ::= { ds3 14 }

              ds3Groups      OBJECT IDENTIFIER ::= {
              ds3Conformance 1 } ds3Compliances OBJECT
              IDENTIFIER ::= { ds3Conformance 2 }



              -- compliance statements

              ds3Compliance MODULE-COMPLIANCE
                 STATUS   current
                 DESCRIPTION
                         "The compliance statement for DS3/E3
                         interfaces."
        MODULE  -- this module
            MANDATORY-GROUPS { ds3NearEndConfigGroup,
                               ds3NearEndStatisticsGroup }

            GROUP       ds3FarEndGroup
            DESCRIPTION
                "Implementation of this group is optional for all
                systems that attach to a DS3 Interface.  However,
                only C-bit Parity and SYNTRAN DS3 applications
                have the capability (option) of providing this
                information."
```

```
            GROUP        ds3NearEndOptionalConfigGroup
            DESCRIPTION
                "Implementation of this group is optional for all
                systems that attach to a DS3 interface."

            OBJECT        dsx3LineType
            MIN-ACCESS   read-only
            DESCRIPTION
                "Write access for the line type is not required."

            OBJECT        dsx3LineCoding
            MIN-ACCESS   read-only
            DESCRIPTION
                "Write access for the line coding is not
                required."

            OBJECT        dsx3SendCode
            MIN-ACCESS   read-only
            DESCRIPTION
                "Write access for the send code is not required."

            OBJECT        dsx3LoopbackConfig
            MIN-ACCESS   read-only
            DESCRIPTION
                "Write access for loopbacks is not required."

            OBJECT        dsx3TransmitClockSource
            MIN-ACCESS   read-only
            DESCRIPTION
                "Write access for the transmit clock source is not
                required."

            OBJECT        dsx3LineLength
            MIN-ACCESS   read-only
            DESCRIPTION
                "Write access for the line length is not
                required."

            OBJECT        dsx3Channelization
            MIN-ACCESS   read-only
            DESCRIPTION
                "Write access for the channelization is not
                required."

        ::= { ds3Compliances 1 }

    -- units of conformance
```

          ds3NearEndConfigGroup OBJECT-GROUP
              OBJECTS { dsx3LineIndex,
                        dsx3TimeElapsed,
                        dsx3ValidIntervals,
                        dsx3LineType,
                        dsx3LineCoding,
                        dsx3SendCode,
                        dsx3CircuitIdentifier,
                        dsx3LoopbackConfig,
                        dsx3LineStatus,
                        dsx3TransmitClockSource,
                        dsx3InvalidIntervals,
                        dsx3LineLength,
                        dsx3LoopbackStatus,
                        dsx3Channelization,
                        dsx3Ds1ForRemoteLoop }
              STATUS   current
              DESCRIPTION
                      "A collection of objects providing configuration
                      information applicable to all DS3/E3 interfaces."
              ::= { ds3Groups 1 }

         ds3NearEndStatisticsGroup OBJECT-GROUP
              OBJECTS { dsx3CurrentIndex,
                        dsx3CurrentPESs,
                        dsx3CurrentPSESs,
                        dsx3CurrentSEFSs,
                        dsx3CurrentUASs,
                        dsx3CurrentLCVs,
                        dsx3CurrentPCVs,
                        dsx3CurrentLESs,
                        dsx3CurrentCCVs,
                        dsx3CurrentCESs,
                        dsx3CurrentCSESs,
                        dsx3IntervalIndex,
                        dsx3IntervalNumber,
                        dsx3IntervalPESs,
                        dsx3IntervalPSESs,
                        dsx3IntervalSEFSs,
                        dsx3IntervalUASs,
                        dsx3IntervalLCVs,
                        dsx3IntervalPCVs,
                        dsx3IntervalLESs,
                        dsx3IntervalCCVs,
                        dsx3IntervalCESs,
                        dsx3IntervalCSESs,
                        dsx3IntervalValidData,
                        dsx3TotalIndex,

```
                        dsx3TotalPESs,
                        dsx3TotalPSESs,
                        dsx3TotalSEFSs,
                        dsx3TotalUASs,
                        dsx3TotalLCVs,
                        dsx3TotalPCVs,
                        dsx3TotalLESs,
                        dsx3TotalCCVs,
                        dsx3TotalCESs,
                        dsx3TotalCSESs }
              STATUS   current
              DESCRIPTION
                      "A collection of objects providing statistics
                      information applicable to all DS3/E3 interfaces."
              ::= { ds3Groups 2 }

         ds3FarEndGroup  OBJECT-GROUP
              OBJECTS { dsx3FarEndLineIndex,
                        dsx3FarEndEquipCode,
                        dsx3FarEndLocationIDCode,
                        dsx3FarEndFrameIDCode,
                        dsx3FarEndUnitCode,
                        dsx3FarEndFacilityIDCode,
                        dsx3FarEndCurrentIndex,
                        dsx3FarEndTimeElapsed,
                        dsx3FarEndValidIntervals,
                        dsx3FarEndCurrentCESs,
                        dsx3FarEndCurrentCSESs,
                        dsx3FarEndCurrentCCVs,
                        dsx3FarEndCurrentUASs,
                        dsx3FarEndInvalidIntervals,
                        dsx3FarEndIntervalIndex,
                        dsx3FarEndIntervalNumber,
                        dsx3FarEndIntervalCESs,
                        dsx3FarEndIntervalCSESs,
                        dsx3FarEndIntervalCCVs,
                        dsx3FarEndIntervalUASs,
                        dsx3FarEndIntervalValidData,
                        dsx3FarEndTotalIndex,
                        dsx3FarEndTotalCESs,
                        dsx3FarEndTotalCSESs,
                        dsx3FarEndTotalCCVs,
                        dsx3FarEndTotalUASs }
              STATUS   current
              DESCRIPTION
                      "A collection of objects providing remote
                      configuration and statistics information
                      applicable to C-bit Parity and SYNTRAN DS3
```

```
                   interfaces."
           ::= { ds3Groups 3 }


     ds3DeprecatedGroup OBJECT-GROUP
         OBJECTS { dsx3IfIndex,
                   dsx3FracIndex,
                   dsx3FracNumber,
                   dsx3FracIfIndex }
         STATUS   deprecated
         DESCRIPTION
                 "A collection of obsolete objects that may be
                 implemented for backwards compatibility."
         ::= { ds3Groups 4 }


     ds3NearEndOptionalConfigGroup OBJECT-GROUP
         OBJECTS { dsx3LineStatusLastChange,
                   dsx3LineStatusChangeTrapEnable }

         STATUS    current
         DESCRIPTION
                 "A collection of objects that may be implemented
                 on DS3/E3 interfaces."
         ::= { ds3Groups 5 }


     ds3NearEndOptionalTrapGroup NOTIFICATION-GROUP
         NOTIFICATIONS { dsx3LineStatusChange }
         STATUS    current
         DESCRIPTION
                 "A collection of notifications that may be
                 implemented on DS3/E3 interfaces."
         ::= { ds3Groups 6 }


     END
```

4. Appendix A - Use of dsx3IfIndex and dsx3LineIndex

    This Appendix exists to document the previous use if dsx3IfIndex and
    dsx3LineIndex and to clarify the relationship of dsx3LineIndex as
    defined in rfc1407 with the dsx3LineIndex as defined in this
    document.

    The following shows the old and new definitions and the relationship:

    [New Definition]: "This object should be made equal to ifIndex. The
    next paragraph describes its previous usage. Making the object equal
    to ifIndex allows proper use of ifStackTable.

    [Old Definition]: "this object is the identifier of a DS3/E3
    Interface on a managed device. If there is an ifEntry that is
    directly associated with this and only this DS3/E3 interface, it
    should have the same value as ifIndex. Otherwise, number the
    dsx3LineIndices with an unique identifier following the rules of
    choosing a number that is greater than ifNumber and numbering the
    inside interfaces (e.g., equipment side) with even numbers and
    outside interfaces (e.g, network side) with odd numbers."

    When the "Old Definition" was created, my understanding was that it
    was described this way to allow a manager to treat the value _as if_
    it were and ifIndex, i.e. the value would either be: 1) an ifIndex
    value or 2) a value that was guaranteed to be different from all
    valid ifIndex values.

    The new definition is a subset of that definition, i.e. the value is
    always an ifIndex value.

    The following is Section 3.1 from rfc1407:

    Different physical configurations for the support of SNMP with DS3/E3
    equipment exist. To accommodate these scenarios, two different
    indices for DS3/E3 interfaces are introduced in this MIB. These
    indices are dsx3IfIndex and dsx3LineIndex.

    External interface scenario: the SNMP Agent represents all managed
    DS3/E3 lines as external interfaces (for example, an Agent residing
    on the device supporting DS3/E3 interfaces directly):

    For this scenario, all interfaces are assigned an integer value equal
    to ifIndex, and the following applies:

        ifIndex=dsx3IfIndex=dsx3LineIndex for all interfaces.

The dsx3IfIndex column of the DS3/E3 Configuration table relates each
DS3/E3 interface to its corresponding interface (ifIndex) in the
Internet-standard MIB (MIB-II STD 17, RFC1213).

External&Internal interface scenario: the SNMP Agents resides on an
host external from the device supporting DS3/E3 interfaces (e.g., a
router). The Agent represents both the host and the DS3/E3 device.
The index dsx3LineIndex is used to not only represent the DS3/E3
interfaces external from the host/DS3/E3-device combination, but also
the DS3/E3 interfaces connecting the host and the DS3/E3 device. The
index dsx3IfIndex is always equal to ifIndex.

Example:

A shelf full of CSUs connected to a Router. An SNMP Agent residing on
the router proxies for itself and the CSU. The router has also an
Ethernet interface:

```
          +-----+
   |      |     |
   |      |     |                 +---------------------+
   |      |     |  44.736 MBPS |   ds3 M13     Line#A | ds3 C-bit Parity
   |E     |  R  |--------------+ - - - - -  - - - - +------>
   |t     |     |                 |                     |
   |h     |  O  |  44.736 MBPS |   ds3 M13     Line#B | ds3 C-bit Parity
   |e     |     |--------------+ - - - - - - - - - +------>
   |r     |  U  |                 |                     |
   |n     |     |  44.736 MBPS |   ds3 M13     Line#C | ds3 C-bit Parity
   |e     |  T  |--------------+ - - - -- -- - - - - +------>
   |t     |     |                 |                     |
   |      |  E  |  44.736 MBPS |   ds3 M13     Line#D | ds3 C-bit Parity
   |-----|      |--------------+ -  - - - - -- - - - - +------>
   |      |  R  |                 |_____|
   |      |     |
   |      +-----+
```
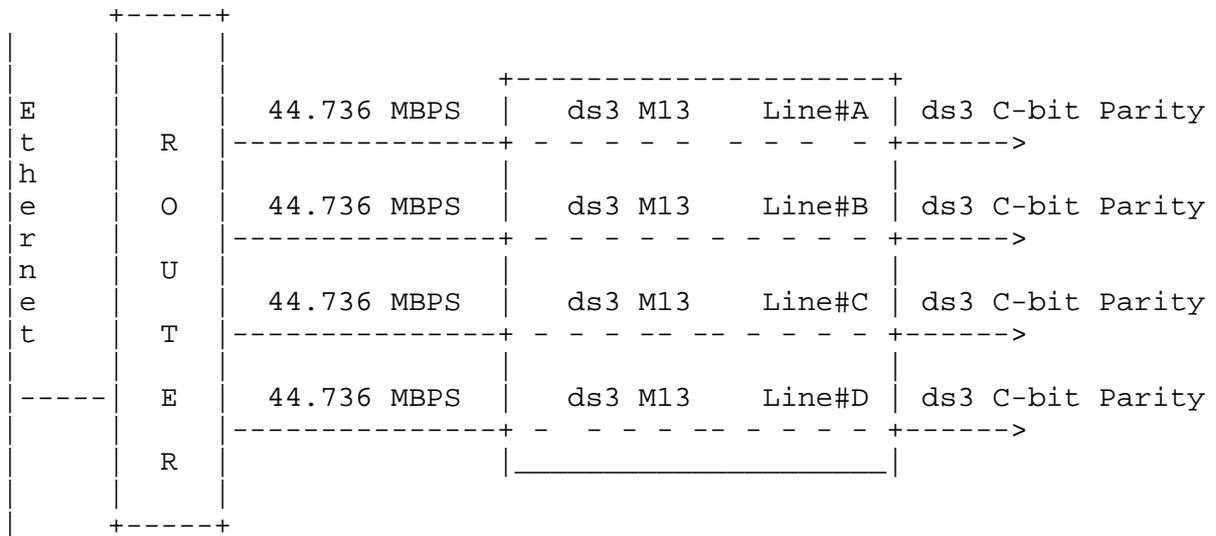
The assignment of the index values could for example be:

```
        ifIndex (= dsx3IfIndex)                     dsx3LineIndex

            1                       NA              NA (Ethernet)
            2       Line#A   Router Side            6
            2       Line#A   Network Side           7
            3       Line#B   Router Side            8
            3       Line#B   Network Side           9
            4       Line#C   Router Side            10
            4       Line#C   Network Side           11
            5       Line#D   Router Side            12
            5       Line#D   Network Side           13
```

For this example, ifNumber is equal to 5. Note the following
description of dsx3LineIndex: the dsx3LineIndex identifies a DS3/E3
Interface on a managed device. If there is an ifEntry that is
directly associated with this and only this DS3/E3 interface, it
should have the same value as ifIndex. Otherwise, number the
dsx3LineIndices with an unique identifier following the rules of
choosing a number greater than ifNumber and numbering inside
interfaces (e.g., equipment side) with even numbers and outside
interfaces (e.g, network side) with odd numbers.

If the CSU shelf is managed by itself by a local SNMP Agent, the
situation would be:

```
        ifIndex (= dsx3IfIndex)                     dsx3LineIndex

            1       Line#A   Network Side           1
            2       Line#A   RouterSide             2
            3       Line#B   Network Side           3
            4       Line#B   RouterSide             4
            5       Line#C   Network Side           5
            6       Line#C   Router Side            6
            7       Line#D   Network Side           7
            8       Line#D   Router Side            8
```

5. Appendix B - The delay approach to Unavialable Seconds.

    This procedure is illustrated below for a DS3 C-Bit parity
    application. Similar rules would apply for other interfaces covered
    by this MIB. The procedure guarantees that the statistical counters
    are correctly updated at all times, although they lag real time by 10
    seconds. At the end of each 15 minutes interval the current interval
    counts are transferred to the most recent interval entry and each
    interval is shifted up by one position, with the oldest being
    discarded if necessary in order to make room. The current interval
    counts then start over from zero. Note, however, that the signal
    state calculation does not start afresh at each interval boundary;
    rather, signal state information is retained across interval
    boundaries.

```
     +------------------------------------------------------------------+
     |            READ COUNTERS & STATUS INFO FROM HARDWARE             |
     |                                                                  |
     |BPV EXZ LOS      PCV CCV AIS SEF OOF LOF           FEBE   RAI     |
     +------------------------------------------------------------------+
        |   |   |       |   |   |   |   |   |             |     |
        |   |   |       |   |   |   |   |   |             |     |
        V   V   V       V   V   V   V   V   V             V     V
     +------------------------------------------------------------------+
     | ACCUM ONE-SEC STATS, CHK ERR THRESHOLDS, & UPDT SIGNAL STATE    |
     |                                                                  |
     |<------------- NEAR END ---------------->| |<---- FAR END ----->|
     |                                                                  |
     |LCV LES PCV CCV PES CES PSES CSES SEFS A/U CCV CES CSES SEFS A/U|
     +------------------------------------------------------------------+
        |   |   |   |   |   |   |    |    |   |   |   |    |    |   |
        |   |   |   |   |   |   |    |    |   |   |   |    |    |   |
        V   V   V   V   V   V   V    V    V   |   V   V    V    V   |
     +---------------------------------------+ | +----------------+ |
     |           ONE-SEC DELAY               | | | ONE-SEC DELAY  | |
     |            (1 OF 10)                  | | |  (1 OF 10)     | |
     +---------------------------------------+ | +----------------+ |
        |   |   |   |   |   |   |    |    |   |   |   |    |    |   |
        /   /   /   /   /   /   /    /    /   /   /   /    /    /   /
        |   |   |   |   |   |   |    |    |   |   |   |    |    |   |
        V   V   V   V   V   V   V    V    V   |   V   V    V    V   |
     +---------------------------------------+ | +----------------+ |
     |           ONE-SEC DELAY               | | | ONE-SEC DELAY  | |
     |            (10 OF 10)                 | | |  (10 OF 10)    | |
     +---------------------------------------+ | +----------------+ |
        |   |   |   |   |   |   |    |    |   |   |   |    |    |   |
        |   |   |   |   |   |   |    |    |   |   |   |    |    |   |
        V   V   V   V   V   V   V    V    V   V   V   V    V    V   V
```
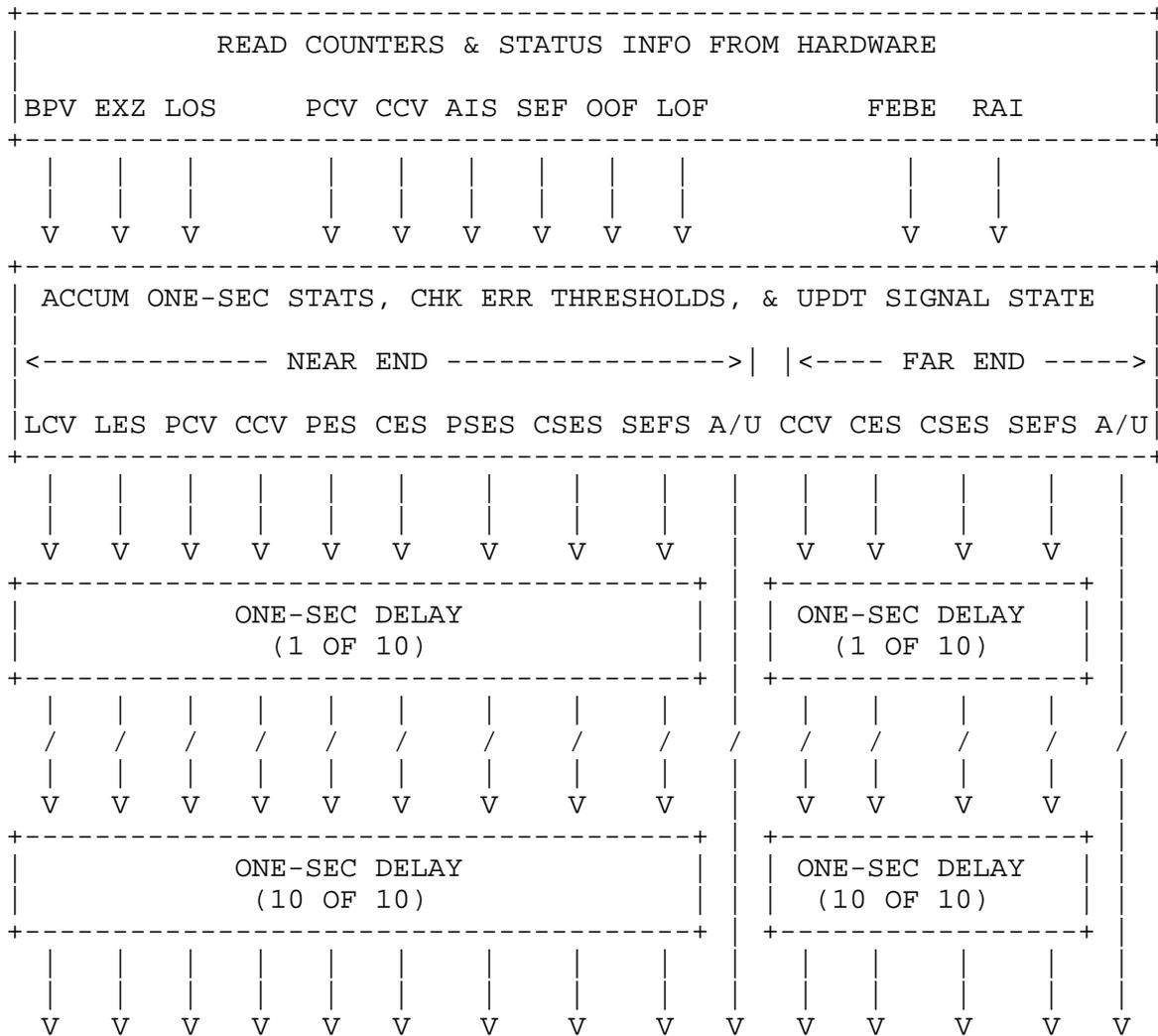
```
+----------------------------------------------------------------+
|                    UPDATE STATISTICS COUNTERS                  |
|                                                                |
|<------------- NEAR END ---------------->|  |<---- FAR END ----->|
|                                                                |
|LCV LES PCV CCV PES CES PSES CSES SEFS UAS CCV CES CSES SEFS UAS|
+----------------------------------------------------------------+
```

Note that if such a procedure is adopted there is no current interval
data for the first ten seconds after a system comes up.
noSuchInstance must be returned if a management station attempts to
access the current interval counters during this time.

It is an implementation-specific matter whether an agent assumes that
the initial state of the interface is available or unavailable.

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7. Acknowledgments

   This document was produced by the Trunk MIB Working Group

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9. Security Considerations

   SNMPv1 by itself is such an insecure environment. Even if the
   network itself is secure (for example by using IPSec), even then,
   there is no control as to who on the secure network is allowed to
   access and GET (read) the objects in this MIB.

   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 2274 [12] and the View-based
   Access Control Model RFC 2275 [15] is recommended.

   It is then a customer/user 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.

   Setting any of the following objects to an inappropriate value can
   cause loss of traffic. The definition of inappropriate varies for
   each object. In the case of dsx3LineType, for example, both ends of
   a ds3/e3 must have the same value in order for traffic to flow. In
   the case of dsx3SendCode and dsx3LoopbackConfig, for another example,
   traffic may stop transmitting when particular loopbacks are applied.

```
   dsx3LineType
   dsx3LineCoding
   dsx3SendCode
   dsx3LoopbackConfig
   dsx3TransmitClockSource
   dsx3LineLength
   dsx3Channelization
```

Setting the following object is mischevious, but not harmful to
traffic
```
   dsx3CircuitIdentifier
```

Setting the following object can cause an increase in the number of
traps received by the network management station.
```
   dsx3LineStatusChangeTrabEnable
```

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