### Definitions of Managed Objects
### for the DS3/E3 Interface Type

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Status of this Memo

Abstract

   This memo defines an experimental 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,
   DS1/E1/DS2/E2 and SONET/SDH Interface Types, rfcTBD [14], rfcTBD [6]
   and rfcTBD [7].

   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.

This memo does not specify a standard for the Internet community.

This document entirely replaces RFC 1407.

**1.  The SNMPv2 Network Management Framework**


The SNMP Network Management Framework presently consists of three
major components.   They are:

o     the SMI, described in RFC 1902 [1] - the mechanisms used for
      describing and naming objects for the purpose of management.

o     the MIB-II, STD 17, RFC 1213 [2] - the core set of managed
      objects for the Internet suite of protocols.

o     the protocol, RFC 1157 [3] and/or RFC 1905 [4], - the protocol
      for accessing managed objects.

The Framework permits new objects to be defined for the purpose of
experimentation and evaluation.

## 2.  Object Definitions

   Managed objects are accessed via a virtual information store, termed
   the Management Information Base or MIB.  Objects in the MIB are
   defined using the subset of Abstract Syntax Notation One (ASN.1)
   defined in the SMI.  In particular, each object type is named by an
   OBJECT IDENTIFIER, an administratively assigned name.  The object
   type together with an object instance serves to uniquely identify a
   specific instantiation of the object.  For human convenience, we
   often use a textual string, termed the descriptor, to also refer to
   the object type.

### 2.1.  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.

## 3.  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].

### 3.1.  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


## 3.2.  Usage Guidelines

### 3.2.1.  Usage of ifStackTable

   The objects dsx3IfIndex and dsx3LineIndex have been deprecated.
   These objects previously allowed a very special proxy situation to
   exist for Routers and CSUs. This section now describes how to use
   ifStackTable to represent this relationship.

   The paragraphs discussing dsx3IfIndex and dsx3LineIndex have been
   preserved in Appendix A for informational purposes.

   The ifStackTable is used in the proxy case to represent the
   assoication between pairs of interfaces, e.g. this DS3 is attached to
   that DS3.  This use is consistent with the use of the ifStackTable to
   show the assoication between various sub-layers of an interface.  In
   both cases entire PDUs are exchanged between the interface pairs - in
   the case of a DS3, entire DS3 frames are exchanged; in the case of
   PPP and HDLC, entire HDLC frames are exchanged.  This usage is not
   meant to suggest the use of the ifStackTable to represent Time
   Division Multiplexing (TDM) connections in general.

   External&Internal interface scenario: the SNMP Agent resides on a
   host external from the device supporting DS3/E3 interfaces (e.g., a
   router). The Agent represents both the host and the DS3/E3 device.

   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:


        +-----+
     |     |     |
     |     |     |                  +--------------------+
     |E    |     |   44.736 MBPS |   ds3 M13    Line#A | ds3 C-bit Parity
     |t    |  R  |--------------+ - - - - -   - - -  - +------>

```
|h     |      |               |                 |
|e     |  O   |  44.736 MBPS  |   ds3 M13   Line#B | ds3 C-bit Parity
|r     |      |---------------+ - - - - - - - - - +------>
|n     |  U   |               |                 |
|e     |      |  44.736 MBPS  |   ds3 M13    Line#C | ds3 C-bit Parity
|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   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
```

## 3.2.2.  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
```

### 3.2.3.  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
```

### 3.2.4.  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.


## 3.3.  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.

## 3.4.  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.

### 3.4.1.  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)

### 3.4.2.  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.


3.4.3.  **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.

**3.4.4**.  **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.

4.  **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 "9802112330Z"
    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."
```

```
                ::= { 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 valid 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 valid 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 for which no valid data
                    is available."
            ::= { 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, encountered by a DS3 interface in
                    the current 15 minute interval.  noSuchInstance
                    will be returned if no data is available."
             ::= { 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, encountered by a DS3
                    interface in the current 15 minute interval.
                    noSuchInstance will be returned if no data is
                    available."
             ::= { 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, encountered by a
                    DS3/E3 interface in the current 15 minute
                    interval.  noSuchInstance will be returned if no
                    data is available."
             ::= { dsx3CurrentEntry 4 }

        dsx3CurrentUASs OBJECT-TYPE
             SYNTAX  PerfCurrentCount
             MAX-ACCESS  read-only
             STATUS  current
             DESCRIPTION

                    "The counter associated with the number of
                    Unavailable Seconds, encountered by a DS3
                    interface in the current 15 minute interval.
                    noSuchInstance will be returned if no data is
                    available."
              ::= { dsx3CurrentEntry 5 }

         dsx3CurrentLCVs OBJECT-TYPE
              SYNTAX  PerfCurrentCount
              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 current 15 minute interval.
                    noSuchInstance will be returned if no data is
                    available."
              ::= { 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, encountered by a DS3 interface
                    in the current 15 minute interval.  noSuchInstance
                    will be returned if no data is available."
              ::= { dsx3CurrentEntry 7 }

         dsx3CurrentLESs OBJECT-TYPE
              SYNTAX  PerfCurrentCount
              MAX-ACCESS  read-only
              STATUS  current
              DESCRIPTION
                    "The number of Line Errored Seconds encountered by
                    a DS3/E3 interface in the current 15 minute
                    interval.  noSuchInstance will be returned if no
                    data is available."
              ::= { dsx3CurrentEntry 8 }

         dsx3CurrentCCVs OBJECT-TYPE
              SYNTAX  PerfCurrentCount
              MAX-ACCESS  read-only
              STATUS  current

                DESCRIPTION
                        "The number of C-bit Coding Violations encountered
                        by a DS3 interface in the current 15 minute
                        interval.  noSuchInstance will be returned if no
                        data is available."
                ::= { dsx3CurrentEntry 9 }

        dsx3CurrentCESs OBJECT-TYPE
                SYNTAX  PerfCurrentCount
                MAX-ACCESS  read-only
                STATUS  current
                DESCRIPTION
                        "The number of C-bit Errored Seconds encountered
                        by a DS3 interface in the current 15 minute
                        interval.  noSuchInstance will be returned if no
                        data is available."
                ::= { dsx3CurrentEntry 10 }

        dsx3CurrentCSESs OBJECT-TYPE
                SYNTAX  PerfCurrentCount
                MAX-ACCESS  read-only
                STATUS  current
                DESCRIPTION
                        "The number of C-bit Severely Errored Seconds
                        encountered by a DS3 interface in the current 15
                        minute interval.  noSuchInstance will be returned
                        if no data is available."
                ::= { 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."

             ::= { 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, 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 valid data is not available, return
                     noSuchInstance."
             ::= { 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, 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 valid data is not available, return
                     noSuchInstance."
             ::= { 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, encountered by a
                       DS3/E3 interface in one of the previous 96,
                       individual 15 minute, intervals. In the case where
                       the agent is a proxy and valid data is not
                       available, return noSuchInstance."
                ::= { dsx3IntervalEntry 5 }

            dsx3IntervalUASs OBJECT-TYPE
                SYNTAX  PerfIntervalCount
                MAX-ACCESS  read-only
                STATUS  current
                DESCRIPTION
                       "The counter associated with the number of
                       Unavailable 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 valid data is not available, return
                       noSuchInstance. 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 encountered by a DS3/E3
                       interface in one of the previous 96, individual 15
                       minute, intervals. In the case where the agent is
                       a proxy and valid data is not available, return
                       noSuchInstance."
                ::= { 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, 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 valid data is not available, return
                        noSuchInstance."
                ::= { 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) encountered by a DS3/E3
                        interface in one of the previous 96, individual 15
                        minute, intervals. In the case where the agent is
                        a proxy and valid data is not available, return
                        noSuchInstance."
                ::= { dsx3IntervalEntry 9 }

        dsx3IntervalCCVs OBJECT-TYPE
                SYNTAX  PerfIntervalCount
                MAX-ACCESS  read-only
                STATUS  current
                DESCRIPTION
                        "The number of C-bit Coding Violations 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 valid data is not
                        available, return noSuchInstance."
                ::= { dsx3IntervalEntry 10 }

        dsx3IntervalCESs OBJECT-TYPE
                SYNTAX  PerfIntervalCount
                MAX-ACCESS  read-only
                STATUS  current
                DESCRIPTION
                        "The number of 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 valid data is not
                        available, return noSuchInstance."
                ::= { dsx3IntervalEntry 11 }

         dsx3IntervalCSESs OBJECT-TYPE
             SYNTAX  PerfIntervalCount
             MAX-ACCESS  read-only
             STATUS  current
             DESCRIPTION
                     "The number of C-bit Severely 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 valid data
                     is not available, return noSuchInstance."
             ::= { dsx3IntervalEntry 12 }

         dsx3IntervalValidData OBJECT-TYPE
             SYNTAX  TruthValue
             MAX-ACCESS read-only
             STATUS current
             DESCRIPTION
                     "This variable indicates if there is valid data
                     for this interval."
             ::= { 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."
           ::= { 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 valid 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 encountered by a DS3
                    interface in the current 15 minute interval.
                    noSuchInstance will be returned if no data is
                    available."
              ::= { 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 encountered by a
                    DS3 interface in the current 15 minute interval.
                    noSuchInstance will be returned if no data is
                    available."
              ::= { 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 encountered by a DS3 interface
                    in the current 15 minute interval.  noSuchInstance
                    will be returned if no data is available."
              ::= { 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 encountered by a DS3 interface
                    in the current 15 minute interval.  noSuchInstance
                    will be returned if no data is available."
              ::= { dsx3FarEndCurrentEntry 7 }

          dsx3FarEndInvalidIntervals OBJECT-TYPE
              SYNTAX  INTEGER (0..96)
              MAX-ACCESS  read-only

```
            STATUS  current
            DESCRIPTION
                    "The number of intervals for which no valid data
                    is available."
            ::= { 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 valid 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 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 valid data is not
                    available, return noSuchInstance."
            ::= { 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 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 valid data is not available, return
                    noSuchInstance."
            ::= { 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 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 valid data is not available, return
                    noSuchInstance."
            ::= { dsx3FarEndIntervalEntry 6 }

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

**5**.  **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
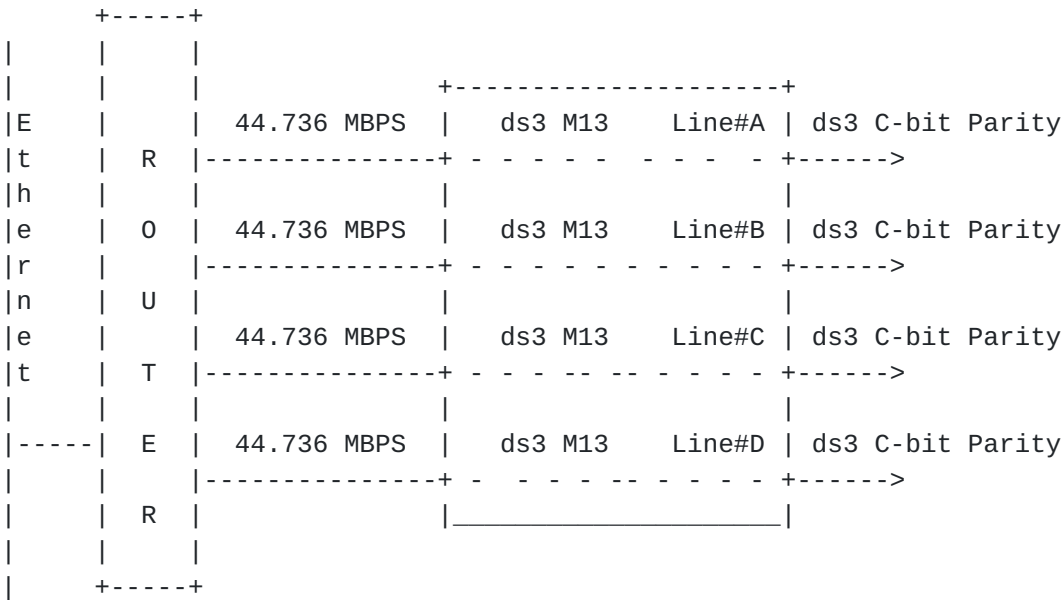   to ifIndex, and the following applies:

     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:


```
        +-----+
  |     |     |
  |     |     |                  +--------------------+
  |E    |     |   44.736 MBPS  |   ds3 M13    Line#A | ds3 C-bit Parity
  |t    |  R  |---------------+ - - - - -   - - -  - +------>
  |h    |     |               |                      |
  |e    |  O  |   44.736 MBPS  |   ds3 M13    Line#B | ds3 C-bit Parity
  |r    |     |---------------+ - - - - - - - - - - +------>
  |n    |  U  |               |                      |
  |e    |     |   44.736 MBPS  |   ds3 M13    Line#C | ds3 C-bit Parity
  |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
```


**6.  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.


**7**.  **Acknowledgments**

    This document was produced by the Trunk MIB Working Group

## 8.  References

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    for the SONET/SDH Interface Type", RFC1595, Bell Communications
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     ETS "34M" -- Metropolitan Area Network Physical Convergence
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     T/NA(91)18, May 1991.

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9.  **Security Considerations**

   This MIB adds no security issues that are not raised by SNMP itself.
   As a Network Management Protocol, SNMP is capable of changing the
   configuration of a system, of denial of service attacks through
   requiring the agent to respond to its messages, and displaying values
   of system counters and configuration settings in the clear where an
   adversary might read them. This, however, is not in itself a threat:
   this is the function of the protocol, but could be misused. Such
   misuse can be avoided or minimized through SNMP Security.

   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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