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Definitions of Managed Objects for the DS1 Interface Type

Status of this Memo

This memo defines objects for managing DS1 Interface objects for use with the SNMP protocol. This memo is a product of the Transmission MIB Working Group of the Internet Engineering Task Force (IETF). This RFC specifies an IAB standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "IAB Official Protocol Standards" for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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1. Abstract

This memo defines an experimental portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP-based internets. In particular, this memo defines MIB objects

for representing DS1 physical interfaces. Implementors should consult in addition to this memo the companion document that describes that DS3 managed objects.

2. The Network Management Framework

The Internet-standard Network Management Framework consists of three components. They are:

RFC 1155 which defines the SMI, the mechanisms used for describing and naming objects for the purpose of management. RFC 1212 defines a more concise description mechanism, which is wholly consistent with the SMI.

RFC 1156 which defines MIB-I, the core set of managed objects for the Internet suite of protocols. RFC 1213, defines MIB-II, an evolution of MIB-I based on implementation experience and new operational requirements.

RFC 1157 which defines the SNMP, the protocol used for network access to managed objects.

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

3. Objects

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) [7] defined in the SMI. In particular, each object has a name, a syntax, and an encoding. The name is an object identifier, an administratively assigned name, which specifies an object type. 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 OBJECT DESCRIPTOR, to also refer to the object type.

The syntax of an object type defines the abstract data structure corresponding to that object type. The ASN.1 language is used for this purpose. However, the SMI [3] purposely restricts the ASN.1 constructs which may be used. These restrictions are explicitly made for simplicity.

The encoding of an object type is simply how that object type is represented using the object type's syntax. Implicitly tied to the notion of an object type's syntax and encoding is how the object type is represented when being transmitted on the network.

The SMI specifies the use of the basic encoding rules of ASN.1 [8], subject to the additional requirements imposed by the SNMP.

3.1. Format of Definitions

Section 5 contains contains the specification of all object types contained in this MIB module. The object types are defined using the conventions defined in the SMI, as amended by the extensions specified in [13].

4. Overview

These objects are used when the particular media being used to realize an interface is a DS1 physical interface. At present, this applies to these values of the ifType variable in the Internet-standard MIB:

```
ds1 (18)
e1  (19)
```

The definitions contained herein are based on the AT&T T-1 specifications and Extended Superframe (ESF) format [9, 10], the latter of which conforms to proposed ANSI specifications [14, 15]. The various T1 and E1 line disciplines are similar enough that separate MIBs are unwarranted, although there are some differences. For example, Loss of Frame is defined more rigorously in the ESF specification than in the D4 specification, but it is defined in both.

4.1. Binding between Interfaces and CSUs

It should be noted that it is possible to multiplex multiple bit streams onto a single DS1 physical interface (CSU), realizing multiple interfaces from the perspective of the Internet-standard MIB. It is also possible to concatenate physical interfaces to provide a single logical interface. As such, it is important to be able to distinguish between the indices used to identify the CSUs attached to a node and the indices used to identify an interface (in the MIB sense) attached to a node.

Each agent which resides on a host which uses DS1 physical interfaces is required to assign a small, positive integer uniquely to each CSU. This is known as the "CSUIndex", and is used to distinguish between different CSUs attached to a node. The CSUIndex is also used as the "key" when accessing tabular information about DS1 physical interfaces.

The potentially many-to-one binding between CSU indices and the

ifIndex value assigned to each MIB interface are defined in the ds1ConfigTable table defined in the next section.

4.2. Objectives of this MIB Module

There are numerous things that could be included in a MIB for DS1 Interfaces: the management of multiplexors, CSUs, DSUs, and the like. The intent of this document is to facilitate the common management of CSUs, both in-chassis and external via proxy. 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 CSUs that are currently deployed, which is to say ESF CSUs conforming to AT&T specifications. However, by simple generalization of these objects, the MIB is also made applicable to D4 and G.704 devices.

To meet a requirement not easily satisfied in other places, there is one additional group present, the Fractional DS1 group. This is intended to facilitate the use of fractional DS1 devices (i.e., devices which utilize a subset of the 8 bit channels available in the frame) over the managed CSUs.

4.3. DS1 Terminology

The terminology used in this document to describe error conditions on a T1 or E1 circuit monitored by a CSU are from references [10], [11], [14], and [15].

Out of Frame event
: An Out of Frame event is declared when the receiver detects two or more framing-bit errors within a 3 millisecond period, or two or more errors out of five or less consecutive framing-bits. At this time, the framer enters the Out of Frame State, and starts searching for a correct framing pattern. The Out of Frame state ends when reframe occurs.

Loss of Signal
: This event is declared upon observing 175 +/- 75 contiguous pulse positions with no pulses of either positive or negative polarity (also called keep alive).

Code Violation Error Event
: A Code Violation Error Event is the occurrence of a received Cyclic Redundancy Check code that is not identical to the corresponding locally-calculated code.

Bipolar Violation
: A Bipolar Violation, for B8ZS-coded signals, is the

occurrence of a received bipolar violation that is not part of a zero-substitution code. It also includes other error patterns such as: eight or more consecutive zeros and incorrect parity.

Errored Seconds
An Errored Second is a second with one or more Code Violation Error Events OR one or more Out of Frame events. In D4 and G.704 section 2.1.3.2 (eg, G.704 which does not implement the CRC), the presence of Bipolar Violations also triggers an Errored Second.

Severely Errored Seconds
A Severely Errored Second is a second with 320 or more Code Violation Error Events OR one or more Out of Frame events.

Severely Errored Framing Second
An Severely Errored Framing Second is a second with one or more Out of Frame events.

Unavailable Signal State
This state is declared at the onset of 10 consecutive Severely Errored Seconds. It is cleared at the onset of 10 consecutive seconds with no Severely Errored Second.

Unavailable Seconds
Unavailable Seconds are calculated by counting the number of seconds that the CSU is in the Unavailable Signal State, including the initial 10 seconds to enter the state but not including the 10 seconds to exit the state.

Note that any second that may be counted as an Unavailable Second may not be counted as an Errored Second, a Severely Errored Second. Since the 10 Severely Errored Seconds that comprise the transition from the available to Unavailable Signal State may also be counted as Errored Seconds, and Severely Errored Seconds previous to entering the state, these three counters are adjusted so that any second counted during this transition is then subtracted. The 10 seconds in the transition from unavailable to available may be counted as Errored Seconds.

A special case exists when the 10 or more second period crosses the 900 second statistics window boundary, as the foregoing description implies that the Severely Errored Second and Unavailable Second counters must be adjusted

when the Unavailable Signal State is entered. Clearly, successive GETs of the affected ds1IntervalSES and ds1IntervalUAS objects will return differing values if the first GET occurs during the first few seconds of the window. This is viewed as an unavoidable side-effect of selecting the presently deployed AT&T objects as a basis for this memo.

Yellow Alarm
A Yellow Alarm is declared because of an incoming Yellow Signal from the far-end. In effect, the circuit is declared to be a one way link.

Red Alarm
A Red Alarm is declared because of an incoming Loss of Signal, Loss of Framing, Alarm Indication Signal. After a Red Alarm is declared, the device sends a Yellow Signal to the far-end. The far-end, when receives the Yellow Signal, declares a Yellow Alarm.

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

5. Definitions

```
RFC1232-MIB DEFINITIONS ::= BEGIN

IMPORTS
        experimental, Counter
                FROM RFC1155-SMI
        DisplayString
                FROM RFC1158-MIB
        OBJECT-TYPE
                FROM RFC-1212;

--  This MIB module uses the extended OBJECT-TYPE macro as
--  defined in [13].


--  this is the MIB module for ds1 objects

ds1 OBJECT IDENTIFIER ::= { experimental 2 }

-- the DS1 Configuration group
```

```
-- Although the objects in this group are read-only, at the
-- agent's discretion they may be made read-write so that the
-- management station, when appropriately authorized, may
-- change the behavior of the CSU, e.g., to place the device
-- into a loopback state or emit a QRSS BER test.

-- Implementation of this group is mandatory for all systems
-- that attach to a ds1.

ds1ConfigTable OBJECT-TYPE
    SYNTAX  SEQUENCE OF DS1ConfigEntry
    ACCESS  not-accessible
    STATUS  mandatory
    DESCRIPTION
            "The DS1 Configuration table."
    ::= { ds1 1 }

ds1ConfigEntry OBJECT-TYPE
    SYNTAX  DS1ConfigEntry
    ACCESS  not-accessible
    STATUS  mandatory
    DESCRIPTION
            "An entry in the DS1 Configuration table."
    INDEX   { ds1CSUIndex }
    ::= { ds1ConfigTable 1 }

DS1ConfigEntry ::=
    SEQUENCE {
        ds1CSUIndex
            INTEGER,
        ds1Index
            INTEGER,
        ds1TimeElapsed
            INTEGER (1..900),
        ds1ValidIntervals
            INTEGER (0..96),
        ds1LineType
            INTEGER,
        ds1ZeroCoding
            INTEGER,
        ds1Loopback
            INTEGER,
        ds1SendCode
            INTEGER,
        ds1YellowAlarm
            INTEGER,
        ds1RedAlarm
            INTEGER,
```

```
            ds1CircuitIdentifier
                DisplayString (SIZE (0..255))
        }

        ds1CSUIndex OBJECT-TYPE
            SYNTAX  INTEGER
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The index value which uniquely identifies the CSU
                    to which this entry is applicable."
            ::= { ds1ConfigEntry 1 }

        ds1Index OBJECT-TYPE
            SYNTAX  INTEGER
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "An index value that uniquely identifies an
                    interface to a ds1.  The interface identified by a
                    particular value of this index is the same
                    interface as identified by the same value an
                    ifIndex object instance."
            ::= { ds1ConfigEntry 2 }

        ds1TimeElapsed OBJECT-TYPE
            SYNTAX  INTEGER (1..900)
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The number of seconds that have elapsed since the
                    beginning of the current error-measurement period.
                    Any fraction is rounded up."
            ::= { ds1ConfigEntry 3 }

        ds1ValidIntervals OBJECT-TYPE
            SYNTAX  INTEGER (0..96)
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The number of previous intervals for which valid
                    data was collected.  The value will be 96 unless
                    the CSU device was brought online within the last
                    24 hours, in which case the value will be the
                    number of complete 15 minute intervals the CSU has
                    been online."
            ::= { ds1ConfigEntry 4 }
```

```
        ds1LineType OBJECT-TYPE
            SYNTAX  INTEGER {
                        other(1),
                        ds1ESF(2),
                        ds1D4(3),
                        ds1ANSI-ESF(4),
                        ds1G704(5),
                        ds1G704-CRC(6)
                    }
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "This variable indicates the variety of DS1 Line
                    implementing this circuit.  The type of circuit
                    affects the number of bits per second that the
                    circuit can reasonably carry, as well as the
                    interpretation of the usage and error statistics.

                    The values, in sequence, describe:
                    TITLE:       SPECIFICATION:
                    ds1ESF        AT&T Extended SuperFrame DS1 [10]
                    ds1D4         AT&T D4 format DS1 [16], [17]
                    ds1ANSI-ESF   ANSI Extended SuperFrame format [14]
                    ds1G704       CCITT Recommendation G.704 [12]
                                    (section 2.1.3.2)
                    ds1G704-CRC   CCITT Recommendation G.704 [12]
                                    (section 2.1.3.1)
                    "
            ::= { ds1ConfigEntry 5 }

        ds1ZeroCoding OBJECT-TYPE
            SYNTAX  INTEGER {
                        ds1JammedBit(1),
                        ds1B8ZS(2),
                        ds1InvertedHDLC(3),
                        ds1HDB3(4),
                        ds1ZBTSI(5)
                    }
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "This variable describes the variety of Zero Code
                    Suppression used on the link, which in turn
                    affects a number of its characteristics.

                    ds1JammedBit refers the Jammed bit Zero Encoding,
                    in which the AT&T specification of at least one
                    pulse every 8 bit periods is literally implemented
```

```
                    by forcing a pulse in bit 8 of each channel.
                    Thus, only seven bits per channel, or 1.344 Mbps,
                    is available for data.

                    ds1B8ZS refers to the use of a specified pattern
                    of normal bits and bipolar violations which are
                    used to replace a sequence of eight zero bits (see
                    [14]).  In this context, all eight bits in a
                    channel are technically available for data, but
                    care must be taken with D4 encoded data to avoid
                    having HDLC Flag streams imitate spurious Yellow
                    Alarm conditions.  Typically, one bit per frame is
                    ignored to force flag streams to rotate, thereby
                    avoiding this error type.  CCITT Recommendation
                    G.703 [11] may be referred to for further
                    definition of these.

                    ds1InvertedHDLC refers to the practice, common on
                    HDLC encoded DS1 data links, of inverting the data
                    between the serial interface chip and the CSU.
                    Since HDLC guarantees one zero every 6 bits in the
                    worst case, while the standards call for (in
                    effect) at least one pulse every eight, inverted
                    HDLC enjoys 4/24 one's density on the line, which
                    may improve the effective clock stability of a DS1
                    line.  As with B8ZS, all eight bits in a channel
                    are technically available for data, but care must
                    be taken with D4 encoded data to avoid having HDLC
                    Flag streams imitate spurious Yellow Alarm
                    conditions.  Typically, one bit per frame is
                    ignored to force flag streams to rotate, thereby
                    avoiding this error type.

                    ANSI Clear Channels may use ds1ZBTSI, or Zero Byte
                    Time Slot Interchange (see [14]).

                    G.704 links, with or without CRC, use ds1HDB3 (see
                    [11]).  "
                ::= { ds1ConfigEntry 6 }

            ds1Loopback OBJECT-TYPE
                SYNTAX  INTEGER {
                            ds1NoLoop(1),
                            ds1LocalLoopbackLocalSide(2),
                            ds1LocalLoopbackRemoteSide(3),
                            ds1RemoteLoopbackLocalSide(4),
                            ds1RemoteLoopbackRemoteSide(5)
                        }
```

```
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "This variable represents the loopback state of
                    the CSU.  Devices supporting read/write access
                    should return badValue in response to a requested
                    loopback state that the CSU does not support.  The
                    values mean:

                    ds1NoLoop

                       Not in the loopback state.  A device that is
                       not capable of performing a loopback on either
                       interface shall always return this as it's
                       value.

                    ds1LocalLoopbackLocalSide

                       Signal received from the local side of the
                       device is looped back at the local connector
                       (eg, without involving the CSU).

                    ds1LocalLoopbackRemoteSide

                       Signal received from the local side of the
                       device is looped back at the remote connector
                       (eg, through the CSU).

                    ds1RemoteLoopbackLocalSide

                       Signal received from the remote side of the
                       device is looped back at the local connector
                       (eg, through the CSU).

                    ds1RemoteLoopbackRemoteSide

                       Signal received from the remote side of the
                       device is looped back at the remote connector
                       (eg, without involving the CSU)."
            ::= { ds1ConfigEntry 7 }

        ds1SendCode OBJECT-TYPE
            SYNTAX  INTEGER {
                        ds1OtherTest(1),
                        ds1SendNoCode(2),
                        ds1SendSetCode(3),
                        ds1SendResetCode(4),
                        ds1SendQRSS(5)
```

```
                }
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
               "This variable indicates what type of code is
               being sent across the DS1 circuit by the CSU.  The
               values mean:

               ds1SendNoCode    sending looped or normal data
               ds1SendSetCode   sending a loopback request
               ds1SendResetCode sending a loopback termination request
               ds1SendQRSS      sending the BERT pattern described in
                                ANSI T1.403-1989 section 5.6
               ds1OtherTest     sending a different BERT/BLERT pattern,
                                such as all zeroes, all ones, etc."
            ::= { ds1ConfigEntry 8 }

        ds1YellowAlarm OBJECT-TYPE
            SYNTAX  INTEGER {
                        ds1NoYellowAlarm (1),
                        ds1YellowAlarm (2)
                    }
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "This variable indicates if a Yellow Alarm
                    condition exists.

                    Note that G.704 interfaces do not support Yellow
                    Alarms.  Accordingly, such agents should return
                    the value ds1NoYellowAlarm."
            ::= { ds1ConfigEntry 9 }

        ds1RedAlarm OBJECT-TYPE
            SYNTAX  INTEGER {
                        ds1NoRedAlarm (1),
                        ds1RedAlarm (2)
                    }
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "This variable indicates if a Red Alarm condition
                    exists.

                    Note that G.704 interfaces do not support Red
                    Alarms.  Accordingly, such agents should return
                    the value ds1NoRedAlarm."
            ::= { ds1ConfigEntry 10 }
```

```
        ds1CircuitIdentifier OBJECT-TYPE
            SYNTAX  DisplayString (SIZE (0..255))
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "This variable contains the transmission vendor's
                    circuit identifier, for the purpose of
                    facilitating troubleshooting."
            ::= { ds1ConfigEntry 11 }


        -- the DS1 Interval group

        -- Implementation of this group is mandatory for all systems
        -- that attach to a ds1.

        -- It is recognized that some currently deployed CSUs do not
        -- record the entire set of statistics specified in this
        -- group.  Accordingly, some agents queried for these objects
        -- may treat these objects as having an ACCESS clause value
        -- of not-accessible.

        -- The DS1 Interval Table contains various statistics
        -- collected by each CSU over the previous 24 hours of
        -- operation.  The past 24 hours are broken into 96 completed
        -- 15 minute intervals.

        ds1IntervalTable OBJECT-TYPE
            SYNTAX  SEQUENCE OF DS1IntervalEntry
            ACCESS  not-accessible
            STATUS  mandatory
            DESCRIPTION
                    "The DS1 Interval table."
            ::= { ds1 2 }

        ds1IntervalEntry OBJECT-TYPE
            SYNTAX  DS1IntervalEntry
            ACCESS  not-accessible
            STATUS  mandatory
            DESCRIPTION
                    "An entry in the DS1 Interval table."
            INDEX   { ds1IntervalIndex, ds1IntervalNumber }
            ::= { ds1IntervalTable 1 }

        DS1IntervalEntry ::=
            SEQUENCE {
                ds1IntervalIndex
                    INTEGER,
```

```
                ds1IntervalNumber
                    INTEGER (1..96),
                ds1IntervalESs
                    Counter,
                ds1IntervalSESs
                    Counter,
                ds1IntervalSEFSs
                    Counter,
                ds1IntervalUASs
                    Counter,
                ds1IntervalCSSs
                    Counter,
                ds1IntervalBPVs
                    Counter,
                ds1IntervalCVs
                    Counter
            }

        ds1IntervalIndex OBJECT-TYPE
            SYNTAX  INTEGER
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The index value which uniquely identifies the CSU
                    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 ds1CSUIndex object instance."
            ::= { ds1IntervalEntry 1 }

        ds1IntervalNumber OBJECT-TYPE
            SYNTAX  INTEGER (1..96)
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "A number between 1 and 96, where 1 is the most
                    recently completed 15 minute interval and 96 is
                    the least recently completed 15 minute interval
                    (assuming that all 96 intervals are valid)."
            ::= { ds1IntervalEntry 2 }

        ds1IntervalESs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of Errored
                    Seconds, as defined by ANSI Draft Standard
```

```
                    T1M1.3/90 - 027R2[15], encountered by a DS1 CSU
                    during one of the previous 96 fifteen minute
                    intervals."
            ::= { ds1IntervalEntry 3 }

        ds1IntervalSESs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of
                    Severely Errored Seconds, as defined by ANSI Draft
                    Standard T1M1.3/90 - 027R2[15], encountered by a
                    DS1 CSU during one of the previous 96 fifteen
                    minute intervals."
            ::= { ds1IntervalEntry 4 }

        ds1IntervalSEFSs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of
                    Severely Errored Framing Seconds, as defined by
                    ANSI Draft Standard T1M1.3/90 - 027R2[15],
                    encountered by a DS1 CSU during one of the
                    previous 96 fifteen minute intervals."
            ::= { ds1IntervalEntry 5 }

        ds1IntervalUASs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of
                    Unavailable Seconds, as defined by ANSI Draft
                    Standard T1M1.3/90 - 027R2[15], encountered by a
                    DS1 CSU during one of the previous 96 fifteen
                    minute intervals."
            ::= { ds1IntervalEntry 6 }

        ds1IntervalCSSs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of
                    Controlled Slip Seconds, as defined by ANSI Draft
```

```
                    Standard T1M1.3/90 - 027R2[15], encountered by a
                    DS1 CSU during one of the previous 96 fifteen
                    minute intervals."
            ::= { ds1IntervalEntry 7 }

        ds1IntervalBPVs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of Bipolar
                    Violations, as defined by ANSI Draft Standard
                    T1M1.3/90 - 027R2[15], encountered by a DS1 CSU
                    during one of the previous 96 fifteen minute
                    intervals."
            ::= { ds1IntervalEntry 8 }

        ds1IntervalCVs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of Code
                    Violation Error Events, as defined by ANSI Draft
                    Standard T1M1.3/90 - 027R2[15], encountered by a
                    DS1 CSU during one of the previous 96 fifteen
                    minute intervals.

                    Note that D4 and G.704 (section 2.1.3.2)
                    interfaces do not support Code Violation Error
                    Events.  Accordingly, such agents may treat this
                    object as having an ACCESS clause value of not-
                    accessible."
            ::= { ds1IntervalEntry 9 }


        -- the DS1 Current group

        -- Implementation of this group is mandatory for all systems
        -- that attach to a ds1.

        -- It is recognized that some currently deployed CSUs do not
        -- record the entire set of statistics specified in this
        -- group.  Accordingly, some agents queried for these objects
        -- may treat these objects as having an ACCESS clause value
        -- of not-accessible.

        -- The DS1 current table contains various statistics being
```

```
        -- collected for the current 15 minute interval.

        ds1CurrentTable OBJECT-TYPE
            SYNTAX  SEQUENCE OF DS1CurrentEntry
            ACCESS  not-accessible
            STATUS  mandatory
            DESCRIPTION
                    "The DS1 Current table."
            ::= { ds1 3 }

        ds1CurrentEntry OBJECT-TYPE
            SYNTAX  DS1CurrentEntry
            ACCESS  not-accessible
            STATUS  mandatory
            DESCRIPTION
                    "An entry in the DS1 Current table."
            INDEX   { ds1CurrentIndex }
            ::= { ds1CurrentTable 1 }

        DS1CurrentEntry ::=
            SEQUENCE {
                ds1CurrentIndex
                    INTEGER,
                ds1CurrentESs
                    Counter,
                ds1CurrentSESs
                    Counter,
                ds1CurrentSEFSs
                    Counter,
                ds1CurrentUASs
                    Counter,
                ds1CurrentCSSs
                    Counter,
                ds1CurrentBPVs
                    Counter,
                ds1CurrentCVs
                    Counter
            }

        ds1CurrentIndex OBJECT-TYPE
            SYNTAX  INTEGER
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The index value which uniquely identifies the CSU
                    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 ds1CSUIndex object instance."
        ::= { ds1CurrentEntry 1 }

    ds1CurrentESs OBJECT-TYPE
        SYNTAX  Counter
        ACCESS  read-only
        STATUS  mandatory
        DESCRIPTION
                "The counter associated with the number of Errored
                Seconds, as defined by ANSI Draft Standard
                T1M1.3/90 - 027R2[15], encountered by a DS1 CSU in
                the current 15 minute interval."
        ::= { ds1CurrentEntry 2 }

    ds1CurrentSESs OBJECT-TYPE
        SYNTAX  Counter
        ACCESS  read-only
        STATUS  mandatory
        DESCRIPTION
                "The counter associated with the number of
                Severely Errored Seconds, as defined by ANSI Draft
                Standard T1M1.3/90 - 027R2[15], encountered by a
                DS1 CSU in the current 15 minute interval."
        ::= { ds1CurrentEntry 3 }

    ds1CurrentSEFSs OBJECT-TYPE
        SYNTAX  Counter
        ACCESS  read-only
        STATUS  mandatory
        DESCRIPTION
                "The counter associated with the number of
                Severely Errored Framing Seconds, as defined by
                ANSI Draft Standard T1M1.3/90 - 027R2[15],
                encountered by a DS1 CSU in the current 15 minute
                interval."
        ::= { ds1CurrentEntry 4 }

    ds1CurrentUASs OBJECT-TYPE
        SYNTAX  Counter
        ACCESS  read-only
        STATUS  mandatory
        DESCRIPTION
                "The counter associated with the number of
                Unavailable Seconds, as defined by ANSI Draft
                Standard T1M1.3/90 - 027R2[15], encountered by a
                DS1 CSU in the current 15 minute interval."
        ::= { ds1CurrentEntry 5 }
```

```
        ds1CurrentCSSs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of
                    Controlled Slip Seconds, as defined by ANSI Draft
                    Standard T1M1.3/90 - 027R2[15], encountered by a
                    DS1 CSU in the current 15 minute interval."
            ::= { ds1CurrentEntry 6 }

        ds1CurrentBPVs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of Bipolar
                    Violations, as defined by ANSI Draft Standard
                    T1M1.3/90 - 027R2[15], encountered by a DS1 CSU in
                    the current 15 minute interval."
            ::= { ds1CurrentEntry 7 }

        ds1CurrentCVs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of Code
                    Violation Error Events, as defined by ANSI Draft
                    Standard T1M1.3/90 - 027R2[15], encountered by a
                    DS1 CSU in the current 15 minute interval.

                    Note that D4 and G.704 (section 2.1.3.2)
                    interfaces do not support Code Violation Error
                    Events.  Accordingly, such agents may treat this
                    object as having an ACCESS clause value of not-
                    accessible."
            ::= { ds1CurrentEntry 8 }


        -- the DS1 Total group

        -- Implementation of this group is mandatory for all systems
        -- that attach to a ds1.

        -- It is recognized that some currently deployed CSUs do not
        -- record the entire set of statistics specified in this
        -- group.  Accordingly, some agents queried for these objects
```

```
        -- may treat these objects as having an ACCESS clause value
        -- of not-accessible.

        -- The DS1 Total Table contains the cumulative sum of the
        -- various statistics for the 24 hour interval preceding the
        -- first valid interval in the ds1CurrentTable.

        ds1TotalTable OBJECT-TYPE
            SYNTAX  SEQUENCE OF DS1TotalEntry
            ACCESS  not-accessible
            STATUS  mandatory
            DESCRIPTION
                    "The DS1 Total table.  24 hour interval."
            ::= { ds1 4 }

        ds1TotalEntry OBJECT-TYPE
            SYNTAX  DS1TotalEntry
            ACCESS  not-accessible
            STATUS  mandatory
            DESCRIPTION
                    "An entry in the DS1 Total table."
            INDEX   { ds1TotalIndex }
            ::= { ds1TotalTable 1 }

        DS1TotalEntry ::=
            SEQUENCE {
                ds1TotalIndex
                    INTEGER,
                ds1TotalESs
                    Counter,
                ds1TotalSESs
                    Counter,
                ds1TotalSEFSs
                    Counter,
                ds1TotalUASs
                    Counter,
                ds1TotalCSSs
                    Counter,
                ds1TotalBPVs
                    Counter,
                ds1TotalCVs
                    Counter
            }

        ds1TotalIndex OBJECT-TYPE
            SYNTAX  INTEGER
            ACCESS  read-only
            STATUS  mandatory
```

```
            DESCRIPTION
                    "The index value which uniquely identifies the CSU
                    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 ds1CSUIndex object instance."
            ::= { ds1TotalEntry 1 }

        ds1TotalESs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of Errored
                    Seconds, as defined by ANSI Draft Standard
                    T1M1.3/90 - 027R2[15], encountered by a DS1 CSU in
                    the previous 24 hour interval"
            ::= { ds1TotalEntry 2 }

        ds1TotalSESs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of
                    Severely Errored Seconds, as defined by ANSI Draft
                    Standard T1M1.3/90 - 027R2[15], encountered by a
                    DS1 CSU in the previous 24 hour interval."
            ::= { ds1TotalEntry 3 }

        ds1TotalSEFSs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of
                    Severely Errored Framing Seconds, as defined by
                    ANSI Draft Standard T1M1.3/90 - 027R2[15],
                    encountered by a DS1 CSU in the previous 24 hour
                    interval."
            ::= { ds1TotalEntry 4 }

        ds1TotalUASs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of
```

```
                    Unavailable Seconds, as defined by ANSI Draft
                    Standard T1M1.3/90 - 027R2[15], encountered by a
                    DS1 CSU in the previous 24 hour interval."
            ::= { ds1TotalEntry 5 }

        ds1TotalCSSs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of
                    Controlled Slip Seconds, as defined by ANSI Draft
                    Standard T1M1.3/90 - 027R2[15], encountered by a
                    DS1 CSU in the previous 24 hour interval."
            ::= { ds1TotalEntry 6 }

        ds1TotalBPVs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of Bipolar
                    Violations, as defined by ANSI Draft Standard
                    T1M1.3/90 - 027R2[15], encountered by a DS1 CSU in
                    the previous 24 hour interval."
            ::= { ds1TotalEntry 7 }

        ds1TotalCVs OBJECT-TYPE
            SYNTAX  Counter
            ACCESS  read-only
            STATUS  mandatory
            DESCRIPTION
                    "The counter associated with the number of Code
                    Violation Error Events, as defined by ANSI Draft
                    Standard T1M1.3/90 - 027R2[15], encountered by a
                    DS1 CSU in the previous 24 hour interval.

                    Note that D4 and G.704 (section 2.1.3.2)
                    interfaces do not support Code Violation Error
                    Events.  Accordingly, such agents may treat this
                    object as having an ACCESS clause value of not-
                    accessible."
            ::= { ds1TotalEntry 8 }


        -- the DS1 Fractional group

        -- Implementation of this group is mandatory for those
```

```
        -- systems utilizing a fractional DS1 capability


        -- The DS1 fractional table contains identifies which DS1
        -- 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 Clear Channel
        -- implementations, exactly one ifTable entry corresponds to
        -- the CSU being managed.  In this very typical case, the
        -- variable ds1Index indicates the value of ifIndex which
        -- corresponds to the interface being supported by a
        -- particular CSU.

        -- However, for fractional DS1 implementations, the
        -- correspondent value of ds1Index is 0, and for each DS1
        -- channel supporting a logical interface, there is an entry
        -- in the DS1 fractional table which names a value for
        -- ifIndex.
        --
        --      For ds1ESF, ds1D4, and ds1ANSI-ESF, there are 24 legal
        --      channels, numbered 1 through 24.
        --
        --      For G.704, there are 32 legal channels, numbered 1
        --      through 32.  ds1G704 can carry user data in channels 2
        --      through 32, channel 1 being an overhead channel.
        --      ds1G704-CRC can carry user data in channels 2 through
        --      16 and 18 through 32, channels 1 and 17 being overhead
        --      channels.

        ds1FracTable OBJECT-TYPE
            SYNTAX  SEQUENCE OF DS1FracEntry
            ACCESS  not-accessible
            STATUS  mandatory
            DESCRIPTION
                    "The DS1 Fractional table."
            ::= { ds1 5 }

        ds1FracEntry OBJECT-TYPE
            SYNTAX  DS1FracEntry
            ACCESS  not-accessible
            STATUS  mandatory
            DESCRIPTION
                    "An entry in the DS1 Fractional table."
            INDEX   { ds1FracIndex, ds1FracNumber }
            ::= { ds1FracTable 1 }

        DS1FracEntry ::=
            SEQUENCE {
```

```
            ds1FracIndex
                INTEGER,
            ds1FracNumber
                INTEGER (1..32),
            ds1FracIfIndex
                INTEGER
        }

    ds1FracIndex OBJECT-TYPE
        SYNTAX  INTEGER
        ACCESS  read-only
        STATUS  mandatory
        DESCRIPTION
                "The index value which uniquely identifies the CSU
                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 ds1CSUIndex object instance."
        ::= { ds1FracEntry 1 }

    ds1FracNumber OBJECT-TYPE
        SYNTAX  INTEGER (1..32)
        ACCESS  read-only
        STATUS  mandatory
        DESCRIPTION
                "The channel number for this entry."
        ::= { ds1FracEntry 2 }

    ds1FracIfIndex OBJECT-TYPE
        SYNTAX  INTEGER
        ACCESS  read-only
        STATUS  mandatory
        DESCRIPTION
                "An index value that uniquely identifies an
                interface to a ds1.  The interface identified by a
                particular value of this index is the same
                interface as identified by the same value an
                ifIndex object instance."
        ::= { ds1FracEntry 3 }

    END
```

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8. Security Considerations

Security issues are not discussed in this memo.

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