Definitions of Managed Objects for the DS0 and DS0 Bundle Interface Type

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Status of this Memo

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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 DS0 and DS0 Bundle interfaces. This document is a companion document with Definitions of Managed Objects for the DS1/E1/DS2/E2, DS3/E3 and SONET/SDH Interface Types, RFC XXXX [17], RFC XXXX [18] and RFC XXXX [19].

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.

1. The SNMP Management Framework

The SNMP Management Framework presently consists of five major components:

- An overall architecture, described in RFC 2271 [1].
- Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIv1 and described in RFC 1155 [2], RFC 1212 [3] and RFC 1215 [4]. The second version, called SMIv2, is described in RFC 1902 [5], RFC 1903 [6] and RFC 1904 [7].
- Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in RFC 1157 [8]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in RFC 1901 [9] and RFC 1906 [10]. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [10], RFC 2272 [11] and RFC 2274 [12].
- Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in RFC 1157 [8]. A second set of protocol operations and associated PDU formats is described in RFC 1905 [13].
- A set of fundamental applications described in RFC 2273 [14] and the view-based access control mechanism described in RFC 2275 [15]. Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI. This memo specifies a MIB module that is compliant to the SMIv2. A MIB conforming to the SMIv1 can be produced through the appropriate translations. The resulting translated MIB must be semantically equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIv2 will be converted

into textual descriptions in SMIv1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

2. Overview

These objects are used when the particular media being used to realize an interface is a DS0 interface. At present, this applies to these values of the ifType variable in the Internet-standard MIB:

ds0 (81)
ds0Bundle (82)

2.1. BONDing Terminology

Please reference The BONDing Spec [20] for definitions of terms used to describe bonding modes.

2.2. Use of ifTable for DS0 Layer

The following items are defined in RFC 2233 [16].

Only the ifGeneralInformationGroup and ifCounterDiscontinuityGroup need to be supported.

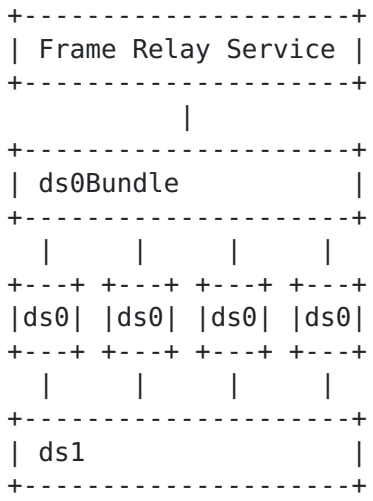
ifTable Object	Use for DS0 Layer
ifIndex	Interface index.
ifDescr	See interfaces MIB [16].
ifType	ds0(81) or ds0Bundle(82).
ifSpeed	64000 for ds0 (regardless of the setting of robbed bit signalling) or N*64000 for ds0Bundle.
ifPhysAddress	The value of the Circuit Identifier. If no Circuit Identifier has been assigned this object should have an octet string with zero length.
ifAdminStatus	See interfaces MIB [16].
ifOperStatus	See interfaces MIB [16].

ifLastChange	See interfaces MIB [16].
ifName	See interfaces MIB [16].
ifLinkUpDownTrapEnable	Set to disabled(2). Supports read-only access.
ifHighSpeed	Set to rounded ifSpeed/1000000.
ifConnectorPresent	Set to false(2).

2.3. Using ifStackTable

This section describes by example how to use ifStackTable to represent the relationship of ds0 and ds0Bundles with ds1 interfaces. Implementors of the stack table for ds0 and ds0Bundle interfaces should look at the appropriate RFC for the service being stacked on ds0s and ds0Bundles. Examples given below are for illustration purposes only.

Example: A Frame Relay Service is being carried on 4 ds0s of a ds1.



The assignment of the index values could for example be:

ifIndex	Description	
1	FrameRelayService	(type 44)
2	ds0Bundle	(type 82)
3	ds0 #1	(type 81)

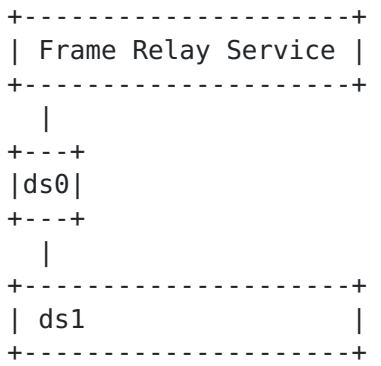
```
          4       ds0 #2          (type 81)
          5       ds0 #3          (type 81)
          6       ds0 #4          (type 81)
          7       ds1             (type 18)
```

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

ifStackTable Entries

HigherLayer	LowerLayer
0	1
1	2
2	3
2	4
2	5
2	6
3	7
4	7
5	7
6	7
7	0

In the case where the frameRelayService is using a single ds0, then the ds0Bundle is not required.



The assignment of the index values could for example be:

ifIndex	Description	
1	FrameRelayService	(type 44)
2	ds0	(type 81)
3	ds1	(type 18)

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

ifStackTable Entries

HigherLayer	LowerLayer
0	1
1	2
2	3
3	0

2.3.1. 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. Timeslot 16 is not created for framing types that do not pass data over it.

Assume that a DS3 (with ifIndex 1) is channelized into DS1s (without DS2s). The object dsx3Channelization is set to enabledDs1. There will be 28 DS1s in the ifTable. 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. When this object is set to this value, 24 DS0s are created by the agent. There will be 24 DS0s in the ifTable for each DS1. If the dsx1Channelization is set to disabled, the 24 DS0s are destroyed.

Assume the entries in the ifTable are created in channel order and the ifIndex values for the DS0s in the first DS1 are 30 through 53. In the DS0 MIB, there will be an entry in the dsx0ChanMappingTable for each DS0. The entries will be as follows:

dsx0ChanMappingTable Entries

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

2.3.2. Usage of ifIndex Mapping for DS0Bundle

An example is given here to explain the ifIndex mapping objects in the DS0Bundle MIB to help the implementor use the objects correctly.

Assume that a DS1 (with ifIndex 1) is channelized into DS0s. There will be 24 DS0s in the ifTable. Assume the entries in the ifTable for the DS0s are created in channel order and the ifIndex values are 2 through 25. **Now, assume that there are two bundles on the DS1.** The first one uses channels 1 and 2. The second uses channels 3 and 4. There will be two ifTable entries for these bundles, with values of 26 and 27 for ifIndex. There will be an entry in the dsx0BundleTable for each bundle. The entries will be as follows:

dsx0BundleTable Entries

dsx0BundleIndex	dsx0BundleIfIndex
1	26
2	27

There will be an entry in the dsx0ConfigTable for each DS0. The entries will be as follows:

dsx0ConfigTable Entries

ifIndex	dsx0Ds0ChannelNumber	dsx0Ds0BundleMappedIfIndex
2	1	26
3	2	26
4	3	27
5	4	27
6	5	0
7	6	0
.....		
25	24	0

3. Overview of the MIB

This document contains 2 MIB modules, the DS0 MIB and the DS0Bundle MIB.

3.1. DS0 MIB

The DS0 MIB is used to represent individual DS0s in a DS1 or E1. Variables in this MIB would be created for each DS0 in the ifTable. This MIB contains the following group:

The DS0 Config Group - This group contains configuration information about a particular DS0.

3.2. DS0Bundle MIB

The DS0Bundle MIB is used to represent collections of DS0s that are used together to carry data within a DS1/E1 at speeds greater than that of a single DS0. DS0Bundles are created on top of DS0s and are represented that way in the ifStackTable. This MIB contains the following groups:

The DS0 Bundle Group - This group contains objects used for creating new ds0Bundles. This group is mandatory.

The DS0 Bonding Group - This group contains information about bonding for a ds0Bundle, if bonding is enabled. This group is optional.

4. Object Definitions for DS0

```
DS0-MIB DEFINITIONS ::= BEGIN

IMPORTS
     MODULE-IDENTITY, OBJECT-TYPE,
     transmission                    FROM SNMPv2-SMI
     MODULE-COMPLIANCE, OBJECT-GROUP  FROM SNMPv2-CONF
     DisplayString, TruthValue        FROM SNMPv2-TC
     ifIndex, InterfaceIndex,
     InterfaceIndexOrZero             FROM IF-MIB;

--  This is the MIB module for the DS0 Interface objects.

ds0 MODULE-IDENTITY
    LAST-UPDATED "9807161630Z"
    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 3619

       E-mail: davef@newbridge.com"
    DESCRIPTION
         "The MIB module to describe
          DS0 interfaces objects."
    REVISION "9805242010Z"
    DESCRIPTION
         "Initial version of the DS0-MIB."

    ::= { transmission 81 }
```

```
          -- The DS0 Config Group

          -- Implementation of this group is mandatory for all
          -- systems that use a DS0 Interface.

          -- The DS0 Config Group consists of two tables:
          --    DS0 Configuration Table
          --    DS0 Channel Mapping Table

          -- The DS0 Configuration Table

          dsx0ConfigTable OBJECT-TYPE
              SYNTAX  SEQUENCE OF Dsx0ConfigEntry
              MAX-ACCESS  not-accessible
              STATUS  current
              DESCRIPTION
                      "The DS0 Configuration table."
              ::= { ds0 1 }

          dsx0ConfigEntry OBJECT-TYPE
              SYNTAX  Dsx0ConfigEntry
              MAX-ACCESS  not-accessible
              STATUS  current
              DESCRIPTION
                      "An entry in the DS0 Configuration table.  There
                      is an entry in this table for each DS0 interface."
              INDEX   { ifIndex }
              ::= { dsx0ConfigTable 1 }

          Dsx0ConfigEntry ::=
              SEQUENCE {
                  dsx0Ds0ChannelNumber        INTEGER,
                  dsx0RobbedBitSignalling     TruthValue,
                  dsx0CircuitIdentifier       DisplayString,
                  dsx0IdleCode                INTEGER,
                  dsx0SeizedCode              INTEGER,
                  dsx0ReceivedCode            INTEGER,
                  dsx0TransmitCodesEnable     TruthValue,
                  dsx0Ds0BundleMappedIfIndex  InterfaceIndexOrZero
          }

          dsx0Ds0ChannelNumber OBJECT-TYPE
              SYNTAX  INTEGER(0..31)
              MAX-ACCESS  read-only
              STATUS  current
```

```
            DESCRIPTION
                    "This object indicates the channel number of the
                    ds0 on its DS1/E1."
            ::= { dsx0ConfigEntry 1 }

        dsx0RobbedBitSignalling OBJECT-TYPE
            SYNTAX  TruthValue
            MAX-ACCESS  read-write
            STATUS  current
            DESCRIPTION
                    "This object indicates if Robbed Bit Signalling is
                    turned on or off for a given ds0.  This only
                    applies to DS0s on a DS1 link.  For E1 links the
                    value is always off (false)."
            ::= { dsx0ConfigEntry 2 }

        dsx0CircuitIdentifier OBJECT-TYPE
             SYNTAX  DisplayString (SIZE (0..255))
             MAX-ACCESS  read-write
             STATUS  current
             DESCRIPTION
                    "This object contains the transmission vendor's
                    circuit identifier, for the purpose of
                    facilitating troubleshooting."
            ::= { dsx0ConfigEntry 3 }

        dsx0IdleCode OBJECT-TYPE
             SYNTAX  INTEGER(0..15)
             MAX-ACCESS  read-write
             STATUS  current
             DESCRIPTION
                    "This object contains the code transmitted in the
                    ABCD bits when the ds0 is not connected and
                    dsx0TransmitCodesEnable is enabled.  The object is
                    a bitmap and the various bit positions are:
                          1     D bit
                          2     C bit
                          4     B bit
                          8     A bit"
            ::= { dsx0ConfigEntry 4 }

        dsx0SeizedCode OBJECT-TYPE
             SYNTAX  INTEGER(0..15)
             MAX-ACCESS  read-write
             STATUS  current
```

```
               DESCRIPTION
                      "This object contains the code transmitted in the
                      ABCD bits when the ds0 is connected and
                      dsx0TransmitCodesEnable is enabled.  The object is
                      a bitmap and the various bit positions are:
                            1     D bit
                            2     C bit
                            4     B bit
                            8     A bit"
                   ::= { dsx0ConfigEntry 5 }

          dsx0ReceivedCode OBJECT-TYPE
               SYNTAX  INTEGER(0..15)
               MAX-ACCESS  read-only
               STATUS  current
               DESCRIPTION
                      "This object contains the code being received in
                      the ABCD bits.  The object is a bitmap and the
                      various bit positions are:
                            1     D bit
                            2     C bit
                            4     B bit
                            8     A bit"
                   ::= { dsx0ConfigEntry 6 }

          dsx0TransmitCodesEnable OBJECT-TYPE
               SYNTAX TruthValue
               MAX-ACCESS  read-write
               STATUS  current
               DESCRIPTION
                      "This object determines if the idle and seized
                      codes are transmitted. If the value of this object
                      is true then the codes are transmitted."
                   ::= { dsx0ConfigEntry 7 }

          dsx0Ds0BundleMappedIfIndex OBJECT-TYPE
               SYNTAX InterfaceIndexOrZero
               MAX-ACCESS  read-only
               STATUS  current
               DESCRIPTION
                      "This object indicates the ifIndex value assigned
                      by the agent for the ds0Bundle(82) ifEntry to
                      which the given ds0(81) ifEntry may belong.

                      If the given ds0(81) ifEntry does not belong to
```

```
                    any ds0Bundle(82) ifEntry, then this object has a
                    value of zero.

                    While this object provides information that can
                    also be found in the ifStackTable, it provides
                    this same information with a single table lookup,
                    rather than by walking the ifStackTable to find
                    the possibly non-existent ds0Bundle(82) ifEntry
                    that may be stacked above the given ds0(81)
                    ifTable entry."
                ::= { dsx0ConfigEntry 8 }

        -- The DS0 Channel Mapping Table

        dsx0ChanMappingTable OBJECT-TYPE
             SYNTAX  SEQUENCE OF Dsx0ChanMappingEntry
             MAX-ACCESS  not-accessible
             STATUS  current
             DESCRIPTION
                    "The DS0 Channel Mapping table.  This table maps a
                    DS0 channel number on a particular DS1/E1 into an
                    ifIndex."
             ::= { ds0 3 }

        dsx0ChanMappingEntry OBJECT-TYPE
             SYNTAX  Dsx0ChanMappingEntry
             MAX-ACCESS  not-accessible
             STATUS  current
             DESCRIPTION
                    "An entry in the DS0 Channel Mapping table.  There
                    is an entry in this table corresponding to each
                    ds0 ifEntry within any interface that is
                    channelized to the individual ds0 ifEntry level.

                    This table is intended to facilitate mapping from
                    channelized interface / channel number to DS0
                    ifEntry.  (e.g. mapping (DS1 ifIndex, DS0 Channel
                    Number) -> ifIndex)

                    While this table provides information that can
                    also be found in the ifStackTable and
                    dsx0ConfigTable, it provides this same information
                    with a single table lookup, rather than by walking
                    the ifStackTable to find the various constituent
                    ds0 ifTable entries, and testing various
```

```
                dsx0ConfigTable entries to check for the entry
                with the applicable DS0 channel number."
        INDEX   { ifIndex, dsx0Ds0ChannelNumber }
        ::= { dsx0ChanMappingTable 1 }

    Dsx0ChanMappingEntry ::=
        SEQUENCE {
            dsx0ChanMappedIfIndex  InterfaceIndex
    }

    dsx0ChanMappedIfIndex OBJECT-TYPE
        SYNTAX  InterfaceIndex
        MAX-ACCESS  read-only
        STATUS  current
        DESCRIPTION
                "This object indicates the ifIndex value assigned
                by the agent for the individual ds0 ifEntry that
                corresponds to the given DS0 channel number
                (specified by the INDEX element
                dsx0Ds0ChannelNumber) of the given channelized
                interface (specified by INDEX element ifIndex)."
        ::= { dsx0ChanMappingEntry 1 }

    -- conformance information

    ds0Conformance OBJECT IDENTIFIER ::= { ds0 2 }

    ds0Groups      OBJECT IDENTIFIER ::= { ds0Conformance 1 }
    ds0Compliances OBJECT IDENTIFIER ::= { ds0Conformance 2 }



    -- compliance statements

    ds0Compliance MODULE-COMPLIANCE
        STATUS  current
        DESCRIPTION
                "The compliance statement for DS0 interfaces."
        MODULE  -- this module
            MANDATORY-GROUPS { ds0ConfigGroup }

            OBJECT dsx0RobbedBitSignalling
            MIN-ACCESS read-only
            DESCRIPTION
                "The ability to set RBS is not required."
```

```
                OBJECT dsx0CircuitIdentifier
                MIN-ACCESS read-only
                DESCRIPTION
                    "The ability to set the circuit identifier is not
                    required."

                OBJECT dsx0IdleCode
                MIN-ACCESS read-only
                DESCRIPTION
                    "The ability to set the idle code is not
                    required."

                OBJECT dsx0SeizedCode
                MIN-ACCESS read-only
                DESCRIPTION
                    "The ability to set the seized code is not
                    required."

                OBJECT dsx0TransmitCodesEnable
                MIN-ACCESS read-only
                DESCRIPTION
                    "The ability to enable and disable the
                    transmitting of idle and seized codes is not
                    required."

            ::= { ds0Compliances 1 }

        -- units of conformance

        ds0ConfigGroup  OBJECT-GROUP
            OBJECTS { dsx0Ds0ChannelNumber,
                      dsx0RobbedBitSignalling,
                      dsx0CircuitIdentifier,
                      dsx0IdleCode,
                      dsx0SeizedCode,
                      dsx0ReceivedCode,
                      dsx0TransmitCodesEnable,
                      dsx0Ds0BundleMappedIfIndex,
                      dsx0ChanMappedIfIndex }
            STATUS  current
            DESCRIPTION
                    "A collection of objects providing configuration
                    information applicable to all DS0 interfaces."
            ::= { ds0Groups 1 }
```

```
END
```

5. Object Definitions for DS0 Bundle

```
DS0BUNDLE-MIB DEFINITIONS ::= BEGIN

IMPORTS
     MODULE-IDENTITY, OBJECT-TYPE,
     transmission                      FROM SNMPv2-SMI
     MODULE-COMPLIANCE, OBJECT-GROUP   FROM SNMPv2-CONF
     DisplayString, RowStatus,
     TestAndIncr                       FROM SNMPv2-TC
     ifIndex, InterfaceIndex           FROM IF-MIB;

--  This is the MIB module for the DS0Bundle Interface
--  objects.

ds0Bundle MODULE-IDENTITY
    LAST-UPDATED "9807161630Z"
    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 3619

       E-mail: davef@newbridge.com"
    DESCRIPTION
         "The MIB module to describe
          DS0 Bundle interfaces objects."
    REVISION "9805242010Z"
    DESCRIPTION
         "Initial version of the DS0BUNDLE-MIB."

    ::= { transmission 82 }
```

```
        --
        -- The DS0 Bundle Config Group
        --
        -- Implementation of this group is mandatory for all
        -- systems that use a DS0Bundle Interface.
        --
        -- The DS0 Bundle Config Group consists of one table:
        --    DS0 Bundle Table

        --  The DS0 Bundle Table

        dsx0BundleNextIndex OBJECT-TYPE
            SYNTAX  TestAndIncr
            MAX-ACCESS  read-write
            STATUS  current
            DESCRIPTION
                    "This object is used to assist the manager in
                    selecting a value for dsx0BundleIndex.  Because
                    this object is of syntax TestAndIncr (see the
                    SNMPv2-TC document, RFC 1903) it can also be used
                    to avoid race conditions with multiple managers
                    trying to create rows in the table.

                    If the result of the SET for dsx0BundleNextIndex
                    is not success, this means the value has been
                    changed from index (i.e. another manager used the
                    value), so a new value is required.

                    The algorithm is:
                    done = false
                    while done == false
                        index = GET (dsx0BundleNextIndex.0)
                        SET (dsx0BundleNextIndex.0=index)
                        if (set failed)
                          done = false
                        else
                          SET(dsx0BundleRowStatus.index=createAndGo)
                          if (set failed)
                            done = false
                          else
                            done = true
                            other error handling"
            ::= { ds0Bundle 2 }

        dsx0BundleTable OBJECT-TYPE
```

```
            SYNTAX  SEQUENCE OF Dsx0BundleEntry
            MAX-ACCESS  not-accessible
            STATUS  current
            DESCRIPTION
                    "There is an row in this table for each ds0Bundle
                    in the system.  This table can be used to
                    (indirectly) create rows in the ifTable with
                    ifType = 'ds0Bundle(82)'."
            ::= { ds0Bundle 3 }

        dsx0BundleEntry OBJECT-TYPE
            SYNTAX  Dsx0BundleEntry
            MAX-ACCESS  not-accessible
            STATUS  current
            DESCRIPTION
                    "There is a row in entry in this table for each
                    ds0Bundle interface."
            INDEX   { dsx0BundleIndex }
            ::= { dsx0BundleTable 1 }

        Dsx0BundleEntry ::=
            SEQUENCE {
                dsx0BundleIndex              INTEGER,
                dsx0BundleIfIndex            InterfaceIndex,
                dsx0BundleCircuitIdentifier  DisplayString,
                dsx0BundleRowStatus          RowStatus
        }

        dsx0BundleIndex OBJECT-TYPE
            SYNTAX  INTEGER (0..2147483647)
            MAX-ACCESS  not-accessible
            STATUS  current
            DESCRIPTION
                    "A unique identifier for a ds0Bundle.  This is not
                    the same value as ifIndex.  This table is not
                    indexed by ifIndex because the manager has to
                    choose the index in a createable row and the agent
                    must be allowed to select ifIndex values."
            ::= { dsx0BundleEntry 1 }

        dsx0BundleIfIndex OBJECT-TYPE
            SYNTAX  InterfaceIndex
            MAX-ACCESS  read-only
            STATUS  current
            DESCRIPTION
```

```
                "The ifIndex value the agent selected for the
                (new) ds0Bundle interface."
            ::= { dsx0BundleEntry 2 }

        dsx0BundleCircuitIdentifier OBJECT-TYPE
             SYNTAX  DisplayString (SIZE (0..255))
             MAX-ACCESS  read-create
             STATUS  current
             DESCRIPTION
                    "This variable contains the transmission vendor's
                    circuit identifier, for the purpose of
                    facilitating troubleshooting."
             ::= { dsx0BundleEntry 3 }

        dsx0BundleRowStatus OBJECT-TYPE
            SYNTAX  RowStatus
            MAX-ACCESS  read-create
            STATUS  current
            DESCRIPTION
                    "This object is used to create and delete rows in
                    this table."
            ::= { dsx0BundleEntry 4 }

        -- The DS0 Bonding Group

        -- Implementation of this group is optional for all
        -- systems that use a DS0Bundle Interface.

        -- The DS0 Bonding Group consists of one table:
        --    DS0 Bonding Table

        -- The DS0 Bonding Table

        dsx0BondingTable OBJECT-TYPE
            SYNTAX  SEQUENCE OF Dsx0BondingEntry
            MAX-ACCESS  not-accessible
            STATUS  current
            DESCRIPTION
                    "The DS0 Bonding table."
            ::= { ds0Bundle 1 }

        dsx0BondingEntry OBJECT-TYPE
            SYNTAX  Dsx0BondingEntry
            MAX-ACCESS  not-accessible
            STATUS  current
```

```
            DESCRIPTION
                    "An entry in the DS0 Bonding table.  There is a
                    row in this table for each DS0Bundle interface."
            INDEX   { ifIndex }
            ::= { dsx0BondingTable 1 }

        Dsx0BondingEntry ::=
            SEQUENCE {
                dsx0BondMode            INTEGER,
                dsx0BondStatus          INTEGER,
                dsx0BondRowStatus       RowStatus
        }

        dsx0BondMode OBJECT-TYPE
            SYNTAX  INTEGER {
                        none(1),
                        other(2),
                        mode0(3),
                        mode1(4),
                        mode2(5),
                        mode3(6)
            }
            MAX-ACCESS  read-create
            STATUS  current
            DESCRIPTION
                    "This object indicates which BONDing mode is used,
                    if any, for a ds0Bundle.  Mode0 provides parameter
                    and number exchange with no synchronization.  Mode
                    1 provides parameter and number exchange.  Mode 1
                    also provides synchronization during
                    initialization but does not include inband
                    monitoring.  Mode 2 provides all of the above plus
                    inband monitoring.  Mode 2 also steals 1/64th of
                    the bandwidth of each channel (thus not supporting
                    n x 56/64 kbit/s data channels for most values of
                    n). Mode 3 provides all of the above, but also
                    provides n x 56/64 kbit/s data channels.  Most
                    common implementations of Mode 3 add an extra
                    channel to support the inband monitoring overhead.
                    ModeNone should be used when the interface is not
                    performing bandwidth-on-demand."
            ::= { dsx0BondingEntry 1 }

        dsx0BondStatus OBJECT-TYPE
            SYNTAX  INTEGER {
```

```
                        idle(1),
                        callSetup(2),
                        dataTransfer(3)
                }
                MAX-ACCESS  read-only
                STATUS  current
                DESCRIPTION
                        "This object indicates the current status of the
                        bonding call using this ds0Bundle. idle(1) should
                        be used when the bonding mode is set to none(1)."
                ::= { dsx0BondingEntry 2 }

            dsx0BondRowStatus OBJECT-TYPE
                SYNTAX  RowStatus
                MAX-ACCESS  read-create
                STATUS  current
                DESCRIPTION
                        "This object is used to create new rows in this
                        table, modify existing rows, and to delete
                        existing rows."
                ::= { dsx0BondingEntry 3 }




            -- conformance information

            ds0BundleConformance OBJECT IDENTIFIER ::= { ds0Bundle 4 }

            ds0BundleGroups      OBJECT IDENTIFIER
                ::= { ds0BundleConformance 1 }

            ds0BundleCompliances OBJECT IDENTIFIER
                ::= { ds0BundleConformance 2 }



            -- compliance statements

            ds0BundleCompliance MODULE-COMPLIANCE
                STATUS  current
                DESCRIPTION
                        "The compliance statement for DS0Bundle
                        interfaces."
                MODULE  -- this module
```

```
                MANDATORY-GROUPS {ds0BundleConfigGroup }

                GROUP       ds0BondingGroup
                DESCRIPTION
                    "Implementation of this group is optional for all
                    systems that attach to a DS0Bundle Interface."

                OBJECT      dsx0BundleRowStatus
                SYNTAX      INTEGER {
                                active(1),
                                createAndGo(4),
                                destroy(6)
                            }
                MIN-ACCESS  read-only
                DESCRIPTION
                    "The agent is not required to support a SET
                    operation to this object, and only three of the
                    six enumerated values for the RowStatus textual
                    convention need be supported.  Only supporting
                    createAndGo for a creation process prevents the
                    manager from creating an inactive row in the
                    ds0BundleTable.  Inactive rows in the
                    ds0BundleTable do not make sense."

                OBJECT      dsx0BundleCircuitIdentifier
                MIN-ACCESS  read-only
                DESCRIPTION
                    "The agent is not required to support a SET
                    operation to this object."

                        ::= { ds0BundleCompliances 1 }

                    -- units of conformance

                    ds0BondingGroup  OBJECT-GROUP
                        OBJECTS { dsx0BondMode,
                                  dsx0BondStatus,
                                  dsx0BondRowStatus }
                        STATUS  current
                        DESCRIPTION
                                "A collection of objects providing
                                configuration information applicable
                                to all DS0 interfaces."
            ::= { ds0BundleGroups 1 }
```

```
        ds0BundleConfigGroup  OBJECT-GROUP
            OBJECTS { dsx0BundleNextIndex,
                      dsx0BundleIfIndex,
                      dsx0BundleCircuitIdentifier,
                      dsx0BundleRowStatus }
            STATUS  current
            DESCRIPTION
                    "A collection of objects providing the ability to
                    create a new ds0Bundle in the ifTable as well as
                    configuration information about the ds0Bundle."
            ::= { ds0BundleGroups 2 }
        END
```

6. Intellectual Property

The IETF takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on the IETF's procedures with respect to rights in standards-track and standards-related documentation can be found in BCP-11. Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementors or users of this specification can be obtained from the IETF Secretariat.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights which may cover technology that may be required to practice this standard. Please address the information to the IETF Executive Director.

7. Acknowledgments

This document was produced by the Trunk MIB Working Group:

8. References

[1] Harrington, D., Presuhn, R., and B. Wijnen, "An Architecture for Describing SNMP Management Frameworks", RFC 2271, Cabletron Systems, Inc., BMC Software, Inc., IBM T. J. Watson Research, January 1998

[2] Rose, M., and K. McCloghrie, "Structure and Identification of Management Information for TCP/IP-based Internets", RFC 1155, Performance Systems International, Hughes LAN Systems, May 1990

[3] Rose, M., and K. McCloghrie, "Concise MIB Definitions", RFC 1212, Performance Systems International, Hughes LAN Systems, March 1991

[4] M. Rose, "A Convention for Defining Traps for use with the SNMP", RFC 1215, Performance Systems International, March 1991

[5] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Structure of Management Information for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1902, SNMP Research,Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.

[6] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Textual Conventions for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1903, SNMP Research, Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.

[7] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Conformance Statements for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1904, SNMP Research, Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.

[8] Case, J., Fedor, M., Schoffstall, M., and J. Davin, "Simple Network Management Protocol", RFC 1157, SNMP Research, Performance Systems International, Performance Systems International, MIT Laboratory for Computer Science, May 1990.

[9] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Introduction to Community-based SNMPv2", RFC 1901, SNMP Research, Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.

[10] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Transport Mappings for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1906, SNMP Research, Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.

[11] Case, J., Harrington D., Presuhn R., and B. Wijnen, "Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)", RFC 2272, SNMP Research, Inc., Cabletron Systems, Inc., BMC Software, Inc., IBM T. J. Watson Research, January 1998.

[12] Blumenthal, U., and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", RFC 2274, IBM T. J. Watson Research, January 1998.

[13] Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1905, SNMP Research, Inc., Cisco Systems, Inc., Dover Beach Consulting, Inc., International Network Services, January 1996.

[14] Levi, D., Meyer, P., and B. Stewart, "SNMPv3 Applications", RFC 2273, SNMP Research, Inc., Secure Computing Corporation, Cisco Systems, January 1998.

[15] Wijnen, B., Presuhn, R., and K. McCloghrie, "View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)", RFC 2275, IBM T. J. Watson Research, BMC Software, Inc., Cisco Systems, Inc., January 1998.

[16] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB using SMIv2", RFC 2233, Cisco Systems, FTP Software, November 1997.

[17] Fowler D., "Definitions of Managed Objects for the DS1 and E1 Interface Types", draft-ietf-trunkmib-ds1-mib-09.txt, Newbridge Networks Corporation, August 1998.

[18] Fowler, D., "Definitions of Managed Objects for the DS3/E3 Interface Types", draft-ietf-trunkmib-ds3-mib-09.txt, Newbridge Networks, August 1998.

[19] Brown, T., and Tesink, K., "Definitions of Managed Objects for the SONET/SDH Interface Type", draft-ietf-atommib-sonetng-02.txt, Bell Communications Research, August 1996.

[20] Sharp, H. (Editor), "Interoperability Requirements for Nx56/64 kbit/s Calls", BONDING Spec Version 1.0, BONDING Consortium, Sept 1992.

9. Security Considerations

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

It is recommended that the implementors consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model RFC 2274 [12] and the View-based Access Control Model RFC 2275 [15] is recommended.

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

Setting the following objects to an inappropriate value can cause loss of traffic. In the case of dsx0RobbedBitSignalling, for example, the nature of the traffic flowing on the DS0 can be affected.

- dsx0RobbedBitSignalling
- dsx0IdleCode
- dsx0SeizedCode
- dsx0TransmitCodesEnable
- dsx0BundleRowStatus
- dsx0BondMode
- dsx0BondRowStatus

Setting the following objects is mischievous, but not harmful to traffic.

- dsx0CircuitIdentifier
- dsx0BundleNextIndex

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