

ISDN Management Information Base
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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 defines a minimal set of managed objects for SNMP-based management of ISDN terminal interfaces. ISDN interfaces are supported on a variety of equipment (for data and voice) including terminal adapters, bridges, hosts, and routers.

This document specifies a MIB module in a manner that is compliant to the SNMPv2 SMI. The set of objects is consistent with the SNMP framework and existing SNMP standards.

This document is a product of the ISDN MIB working group within the Internet Engineering Task Force. Comments are solicited and should be addressed to the working group's mailing list at isdn-mib@cisco.com and/or the author.

The current version of this document reflects changes made during the last call period and the IESG review.

Expires February 1997

[Page 1]

Table of Contents

| | | |
|-------------------------|---|--------------------|
| 1 | The SNMPv2 Network Management Framework | 3 |
| 2 | Object Definitions | 3 |
| 3 | Overview | 4 |
| 3.1 | Structure of the MIB | 4 |
| 3.1.1 | General Description | 4 |
| 3.2 | Relationship to the Interfaces MIB | 5 |
| 3.2.1 | Layering Model | 5 |
| 3.2.2 | ifTestTable | 8 |
| 3.2.3 | ifRcvAddressTable | 8 |
| 3.2.4 | ifEntry | 8 |
| 3.2.4.1 | ifEntry for a Basic Rate hardware interface | 8 |
| 3.2.4.2 | ifEntry for a B channel | 9 |
| 3.2.4.3 | ifEntry for LAPD (D channel Data Link Layer) | 10 |
| 3.2.4.4 | ifEntry for a signaling channel | 12 |
| 3.3 | Relationship to other MIBs | 14 |
| 3.3.1 | Relationship to the DS1/E1 MIB | 14 |
| 3.3.2 | Relationship to the DS0 and DS0Bundle MIBs | 14 |
| 3.3.3 | Relationship to the Dial Control MIB | 14 |
| 3.4 | ISDN interface specific information and implementation hints | 14 |
| 3.4.1 | ISDN leased lines | 14 |
| 3.4.2 | Hyperchannels | 15 |
| 3.4.3 | D channel backup and NFAS trunks | 15 |
| 3.4.4 | X.25 based packet-mode service in B and D channels | 16 |
| 3.4.5 | SPID handling | 16 |
| 3.4.6 | Closed User Groups | 17 |
| 3.4.7 | Provision of point-to-point line topology | 17 |
| 3.4.8 | Speech and audio bearer capability information elements | 18 |
| 3.4.9 | Attaching incoming calls to router ports | 18 |
| 3.4.10 | Usage of isdnMibDirectoryGroup and isdnDirectoryTable | 19 |
| 4 | Definitions | 20 |
| 5 | Acknowledgments | 44 |
| 6 | References | 44 |
| 7 | Security Considerations | 45 |
| 8 | Author's Address | 46 |

Expires February 1997

[Page 2]

1. The SNMPv2 Network Management Framework

The SNMPv2 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 refer to the object type.

Expires February 1997

[Page 3]

3. Overview

3.1. Structure of the MIB

For managing ISDN interfaces, the following information is necessary:

- o Information for managing physical interfaces. In case of ISDN primary rate, this are usually T1 or E1 lines, being managed in the DS1/E1 MIB [[12](#)]. For Basic Rate lines, physical interfaces are managed by this MIB.
- o Information for managing B channels.
- o Information for managing signaling channels.
- o Optionally, information for managing Terminal Endpoints (TE). A Terminal Endpoint is a link layer connection to a switch.
- o Optionally, information for managing a list of directory numbers.

In order to manage connections over ISDN lines, the management of neighbors and call history information is required as well. This information is defined in the Dial Control MIB [[15](#)].

The purpose for splitting the required information in two MIBs is to be able to use parts of this information for non-ISDN interfaces as well. In particular, the Dial Control MIB might also be used for other types of interfaces, e.g. modems or X.25 virtual connections.

Within this document, information has been structured into five groups, which are described in the following chapters.

3.1.1. General Description

This MIB controls all aspects of ISDN interfaces. It consists of five groups.

- o The `isdnMibBasicRateGroup` is used to provide information regarding physical Basic Rate interfaces.
- o The `isdnMibBearerGroup` is used to control B (bearer) channels. It supports configuration parameters as well as statistical information related to B channels.
- o The `isdnMibSignalingGroup` is used to control D (delta) channels. There are three tables in this group. The `isdnSignalingTable` and `isdnSignalingStatsTable` support ISDN Network Layer configuration

and statistics. The isdnLapdTable supports ISDN Data Link Layer (LAPD) configuration and statistics.

- o The optional `isdnMibEndpointGroup` can be used to specify Terminal Endpoints. It is required only if there are non-ISDN endpoints defined for a given D channel, or if additional information like Terminal Endpoint Identifier (TEI) values or Service Profile Identifiers (SPID) is required to identify a given ISDN user.
- o The optional `isdnMibDirectoryGroup` can be used to specify a list of directory numbers for each signaling channel. It is required only if the directory numbers to be accepted differ from the `isdnSignalingCallingAddress` as specified in the `isdnSignalingTable`.

[3.2.](#) Relationship to the Interfaces MIB

This section clarifies the relationship of this MIB to the Interfaces MIB [[11](#)]. Several areas of correlation are addressed in the following subsections. The implementor is referred to the Interfaces MIB document in order to understand the general intent of these areas.

[3.2.1.](#) Layering Model

An ISDN interface usually consists of a D channel and a number of B channels, all of which are layered on top of a physical interface.

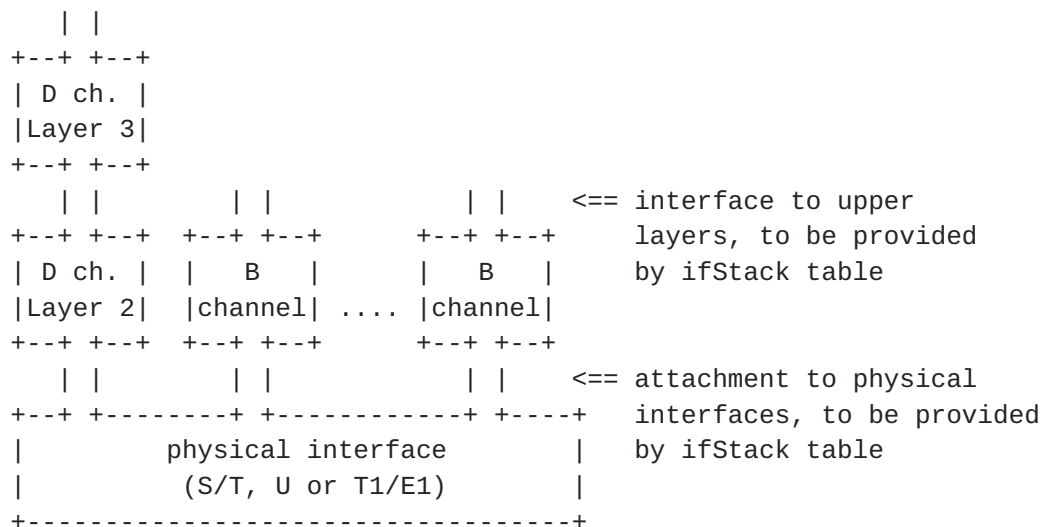
Furthermore, there are multiple interface layers for each D channel. There are Data Link Layer (LAPD) as well as Network Layer entities.

This is accomplished in this MIB by creating a logical interface (`ifEntry`) for each of the D channel entities and a logical interface (`ifEntry`) for each of the B channels. These are then correlated to each other and to the physical interface using the `ifStack` table of the Interfaces MIB [[11](#)].

Expires February 1997

[Page 5]

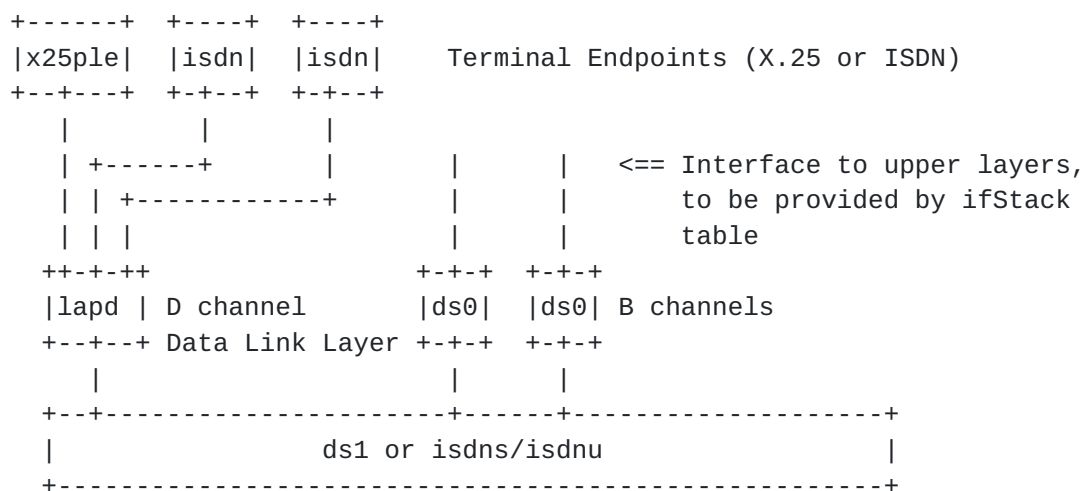
The basic model, therefore, looks something like this:



Mapping of B/D channels to physical interfaces

Each D channel can support multiple Terminal Endpoints. Terminal Endpoints can either be one or multiple ISDN signaling channels, or channels supporting X.25 based packet mode services.

To accomplish this, there can be multiple Network Layer entities on top of each ISDN Data Link Layer (LAPD) interface. The detailed model therefore looks something like this, including interface types as examples:



Detailed interface mapping

IfEntries are maintained for each D channel Network Layer entity

(Terminal Endpoint), for LAPD and for each B channel.

Expires February 1997

[Page 6]

The ifType for a Terminal Endpoint can be isdn(63) for ISDN signaling channels or x25ple(40) for X.25 based packet mode services. The ifType for D channel Data Link Layer (LAPD) interfaces is lapd(77). The ifType for B channels is ds0(81). The ifType for physical interfaces is the matching IANA ifType, usually ds1(18) for Primary Rate interfaces or isdns(75)/isdnu(76) for Basic Rate interfaces.

The ifStackTable is used to map B channels and LAPD interfaces to physical interfaces and to map D channel Network Layer interfaces (Terminal Endpoints) to LAPD.

In the example given above, the assignment of index values could for example be as follows:

| ifIndex | ifType | ISDN MIB tables indexed by ifIndex | Description |
|---------|------------|---|-------------------------------|
| 1 | isdns(75) | isdnBasicRateTable | Basic Rate physical interface |
| 2 | lapd(77) | isdnLapdTable | LAPD interface |
| 3 | x25ple(40) | isdnEndpointTable | X.25 Packet Layer |
| 4 | isdn(63) | isdnSignalingTable isdnEndpointTable | ISDN signaling channel #1 |
| 5 | isdn(63) | isdnSignalingTable isdnEndpointTable | ISDN signaling channel #2 |
| 6 | ds0(81) | isdnBearerTable | B channel #1 |
| 7 | ds0(81) | isdnBearerTable | B channel #2 |
| 8 | ppp(23) | | neighbor entry #1 (see below) |
| 9 | ppp(23) | | neighbor entry #2 (see below) |

The corresponding ifStack table entries would then be:

ifStackTable Entries

| HigherLayer | LowerLayer |
|-------------|------------|
| 0 | 3 |
| 0 | 4 |
| 0 | 5 |
| 0 | 8 |
| 0 | 9 |
| 1 | 0 |
| 2 | 1 |
| 3 | 2 |
| 4 | 2 |
| 5 | 2 |
| 6 | 1 |
| 7 | 1 |
| 8 | 6 |
| 9 | 7 |

Mapping of B channels to upper interface layers is usually done using the Dial Control MIB. For example, mapping on top of B channels might look as follows:

Expires February 1997

[Page 7]

```

+-----+
|               Network Layer Protocol               |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+
| |           | |           | |           | |           | | <== appears active
+-+ +-+      +-+ +-+      +-+ +-+      +-+ +-+      +-+ +-+
| PPP |      | PPP |      | F/R |      | PPP |      | F/R |
| for |      | for |      | for |      | for |      | for |   ifEntry with
|Nbr 1|      |Nbr 2|      |switch|      |Nbr 3|      |switch| shadow
|      |      |      |      | A  |      |      |      | B  | NeighborEntry
+-+ +-+      +-+ +-+      +-+ +-+      +-+ +-+      +-+ +-+
| |           | |           | |           | |           | | <== some actually are
+---+ +---+ +---+ +---+ +---+ +---+ +---+ +---+ +---+ +---+
| B  | | B  | | B  | | B  | | B  |
|channel| |channel| |channel| |channel| |channel|
+---+ +---+ +---+ +---+ +---+ +---+ +---+ +---+ +---+ +---+
| |           | |           | |           | |           | |
+-----+ +-----+ +-----+ +-----+ +-----+ +-----+ +-----+
|               Basic/Primary Rate Interface               |
+-----+

```

Mapping of IP interfaces to Called Neighbors to B Channels

In this model, ifEntries are maintained for each neighbor. Each neighbor is required to have an associated ifEntry. This interface can be of any kind, e.g. PPP or LAPB.

The Dial Control MIB can be used for all types of demand-access interfaces, e.g., ISDN, modems or X.25 virtual connections.

[3.2.2.](#) ifTestTable

The ifTestTable is not supported by this MIB.

[3.2.3.](#) ifRcvAddressTable

The ifRcvAddressTable is not supported by this MIB.

[3.2.4.](#) ifEntry

[3.2.4.1.](#) ifEntry for a Basic Rate hardware interface

The ifGeneralGroup is supported for Basic Rate hardware interfaces.

| ifTable | Comments |
|---------|--|
| ===== | ===== |
| ifIndex | Each ISDN Basic Rate hardware interface is |

represented by an ifEntry.

ifDescr Textual port description.

Expires February 1997

[Page 8]

| | |
|------------------------|--|
| ifType | The IANA value of isdns(75) or isdnu(76), whichever is appropriate. |
| ifSpeed | The overall bandwidth of this interface. |
| ifPhysAddress | Return an empty string. |
| ifAdminStatus | The administrative status of the ISDN interface. |
| ifOperStatus | The current operational status of this interface. The operational status is dormant(5) if the interface is in standby mode, i.e. connected to the network, but without call activity. The operational status is down(2) if the hardware has detected that there is no layer 1 connection to the switch. For other values, refer to the Interfaces MIB. |
| ifLastChange | Refer to the Interfaces MIB. |
| ifLinkUpDownTrapEnable | Refer to the Interfaces MIB. |
| ifConnectorPresent | Refer to the Interfaces MIB. |
| ifHighSpeed | Return zero. |
| ifName | Refer to the Interfaces MIB. |

3.2.4.2. ifEntry for a B channel

The ifEntry for a B channel supports the ifGeneralGroup of the Interfaces MIB.

| | |
|---------------|--|
| ifTable | Comments |
| ===== | ===== |
| ifIndex | Each ISDN B channel is represented by an ifEntry. |
| ifDescr | Textual port description. |
| ifType | The IANA value of ds0(81). |
| ifSpeed | The bandwidth of this B channel. Usually, this is the value of 56000 or 64000. |
| ifPhysAddress | Return an empty string. |

ifAdminStatus The administrative status of this interface.

ifOperStatus The current operational status of this interface.

Expires February 1997

[Page 9]

Note that dormant(5) is explicitly being used as defined in the Interfaces MIB.
For other values, refer to the Interfaces MIB.

ifLastChange Refer to the Interfaces MIB.

ifLinkUpDownTrapEnable
 Refer to the Interfaces MIB.

ifConnectorPresent
 Refer to the Interfaces MIB.

ifHighSpeed Return zero.

ifName Refer to the Interfaces MIB.

3.2.4.3. ifEntry for LAPD (D channel Data Link Layer)

The ifEntry for LAPD (D channel Data Link Layer) supports the ifGeneralGroup and the ifPacketGroup of the Interfaces MIB.

| ifTable | Comments |
|------------------------|--|
| ===== | ===== |
| ifIndex | Each ISDN D channel Data Link layer is represented by an ifEntry. |
| ifDescr | Textual port description. |
| ifType | The IANA value of lapd(77). |
| ifSpeed | The bandwidth of this interface. Usually, this is the value of 16000 for basic rate interfaces or 64000 for primary rate interfaces. |
| ifPhysAddress | Return an empty string. |
| ifAdminStatus | The administrative status of this interface. |
| ifOperStatus | The current operational status of the ISDN LAPD interface. The operational status is dormant(5) if the interface is in standby mode (see Q.931 [8], Annex F, D channel backup procedures). For other values, refer to the Interfaces MIB. |
| ifLastChange | Refer to the Interfaces MIB. |
| ifLinkUpDownTrapEnable | |

Refer to the Interfaces MIB.

ifConnectorPresent

Expires February 1997

[Page 10]

| | |
|--------------------|--|
| | Refer to the Interfaces MIB. |
| ifHighSpeed | Return zero. |
| ifName | Refer to the Interfaces MIB. |
| ifMtu | The size of the largest frame which can be sent/received on this interface, specified in octets. Usually, this is the default value of 260 as specified in Q.921 [6], chapter 5.9.3. |
| ifInOctets | The total number of octets received on this interface. |
| ifInUcastPkts | The number of frames received on this interface whose address is not TEI=127. |
| ifInNUcastPkts | Deprecated. Return the number of frames received on this interface with TEI=127. |
| ifInMulticastPkts | Return zero. |
| ifInBroadcastPkts | Return the number of frames received on this interface with TEI=127. |
| ifInDiscards | The total number of received frames which have been discarded. The possible reasons are: buffer shortage. |
| ifInErrors | The number of inbound frames that contained errors preventing them from being deliverable to LAPD. |
| ifInUnknownProtos | The number of frames with known TEI, but unknown SAPI (Service Access Point Identifier, see Q.921 [6], chapter 3.3.3). |
| ifOutOctets | The total number of octets transmitted on this interface. |
| ifOutUcastPkts | The number of frames transmitted on this interface whose address is not TEI=127. |
| ifOutNUcastPkts | Deprecated. Return the number of frames transmitted on this interface with TEI=127. |
| ifOutMulticastPkts | Return zero. |

ifOutBroadcastPkts

Return the number of frames transmitted

Expires February 1997

[Page 11]

on this interface with TEI=127.

| | |
|---------------|--|
| ifOutDiscards | The total number of outbound frames which were discarded. Possible reasons are: buffer shortage. |
| ifOutErrors | The number of frames which could not be transmitted due to errors. |
| ifOutQlen | Deprecated. Return zero. |
| ifSpecific | Deprecated. Return {0 0}. |

3.2.4.4. ifEntry for a signaling channel

The ifEntry for a signaling channel supports the ifGeneralGroup and the ifPacketGroup of the Interfaces MIB.

| | |
|------------------------|--|
| ifTable | Comments |
| ===== | ===== |
| ifIndex | Each ISDN signaling channel is represented by an ifEntry. |
| ifDescr | Textual port description. |
| ifType | The IANA value of isdn(63). |
| ifSpeed | The bandwidth of this signaling channel. Usually, this is the same value as for LAPD, i.e. 16000 for basic rate interfaces or 64000 for primary rate interfaces. |
| ifPhysAddress | The ISDN address assigned to this signaling channel. This is a copy of isdnSignalingCallingAddress. |
| ifAdminStatus | The administrative status of the signaling channel. |
| ifOperStatus | The current operational status of this signaling channel. The operational status is dormant(5) if the signaling channel is currently not activated. For other values, refer to the Interfaces MIB. |
| ifLastChange | Refer to the Interfaces MIB. |
| ifLinkUpDownTrapEnable | Refer to the Interfaces MIB. |
| ifConnectorPresent | |

Refer to the Interfaces MIB.

ifHighSpeed Return zero.

Expires February 1997

[Page 12]

| | |
|--------------------|--|
| ifName | Refer to the Interfaces MIB. |
| ifMtu | The size of the largest frame which can be sent/received on this signaling channel, specified in octets. Usually, this is the default value of 260 as specified in Q.921 [6], chapter 5.9.3. |
| ifInOctets | The total number of octets received on this signaling channel. |
| ifInUcastPkts | The number of frames received which are targeted to this channel. |
| ifInNUcastPkts | Deprecated. Return the number of frames received on this signaling channel with TEI=127. |
| ifInMulticastPkts | Return zero. |
| ifInBroadcastPkts | Return the number of frames received on this signaling channel with TEI=127. |
| ifInDiscards | The total number of received frames which have been discarded. The possible reasons are: buffer shortage. |
| ifInErrors | The number of inbound frames that contained errors preventing them from being deliverable to the signaling channel. |
| ifInUnknownProtos | Return zero. |
| ifOutOctets | The total number of octets transmitted on this signaling channel. |
| ifOutUcastPkts | The number of frames transmitted on this signaling channel whose address is not TEI=127. |
| ifOutNUcastPkts | Deprecated. Return the number of frames transmitted on this signaling channel with TEI=127. |
| ifOutMulticastPkts | Return zero. |
| ifOutBroadcastPkts | Return the number of frames transmitted on this signaling channel with TEI=127. |
| ifOutDiscards | The total number of outbound frames which |

were discarded. Possible reasons are:
buffer shortage.

Expires February 1997

[Page 13]

| | |
|-------------|--|
| ifOutErrors | The number of frames which could not be transmitted due to errors. |
| ifOutQlen | Deprecated. Return zero. |
| ifSpecific | Deprecated. Return {0 0}. |

3.3. Relationship to other MIBs

3.3.1. Relationship to the DS1/E1 MIB

Implementation of the DS1/E1 MIB [[12](#)] is not required for supporting this MIB. It is however recommended to implement the DS1/E1 MIB on entities supporting Primary Rate interfaces.

3.3.2. Relationship to the DS0 and DS0Bundle MIBs

Implementation of the DS0 MIB [[13](#)] is optional.

Implementation of the DS0Bundle MIB [[13](#)] is required only if hyperchannels are to be supported.

3.3.3. Relationship to the Dial Control MIB

Implementation of the Dial Control MIB [[15](#)] is required.

3.4. ISDN interface specific information and implementation hints

3.4.1. ISDN leased lines

ISDN leased lines can be specified on a per-B-channel basis. To do so, the value of isdnBearerChannelType has to be set to leased(2). There is no signaling protocol support for leased line B channels, since there is no signaling protocol action for these kinds of interfaces.

If there is no signaling support available for an ISDN interface, this must be specified in the appropriate interface specific table. For Basic Rate interfaces, isdnBasicRateSignalMode of isdnBasicRateTable must be set to inactive(2). For Primary Rate interfaces, dsx1SignalMode of dsx1ConfigTable in DS1/E1 MIB [[12](#)] must be set to none(1). There are no isdnLapdTable or isdnSignalingTable entries for such interfaces.

Depending on the leased line type and the service provider, the D channel can be used for data transfer. If this is the case the D channel interface type is ds0(81) instead of lapd(77) and its usage is identical to B channel usage if there is no signaling channel available.

Expires February 1997

[Page 14]

For a Primary Rate interface which is entirely used as a leased line, there is no ISDN specific information available or required. Such leased lines can entirely be handled by the DS1/E1 MIB.

3.4.2. Hyperchannels

The active switch protocol defines if hyperchannels are supported, and the actual support is implementation dependent. Hyperchannel connections will be requested by the interface user at call setup time, e.g. by the neighbor connection handling procedures.

In the ISDN MIB, the `isdnBearerMultirate` object of `isdnBearerTable` can be used to check if hyperchannels are being used for an active call.

If hyperchannels are being used, another interface layer is required to map multiple B channels to a single hyperchannel. This is accomplished by using the `DS0Bundle` MIB [[13](#)].

Each hyperchannel call is treated as one call in the `isdnSignalingStatsTable`, independent of the number of B channels involved.

For a hyperchannel call, all objects in the `isdnBearerTable` entries related to this call (i.e., all `isdnBearerTable` entries associated to B channels used by the hyperchannel) have identical values. The related objects in the `isdnBearerTable` are:

- `isdnBearerPeerAddress`
- `isdnBearerPeerSubAddress`
- `isdnBearerCallOrigin`
- `isdnBearerInfoType`
- `isdnBearerMultirate`
- `isdnBearerCallSetupTime`
- `isdnBearerCallConnectTime`
- `isdnBearerChargedUnits`

3.4.3. D channel backup and NFAS trunks

D channel backup is defined in Q.931 [[8](#)], Annex F. It describes Non-Associated signaling and its use and functionality is basically identical to Non Facility Associated Signaling (NFAS) trunks.

Non Facility Associated Signaling (NFAS) basically means that a D channel on a PRI interface is used to manage calls on other PRI trunks. This is required in North America for H11 channels, since all 24 time slots are being used for B channels.

According to Q.931, Annex F, the D channel backup feature can be provided on a subscription basis and is network dependent. The D channel backup procedure is described in detail in Q.931.

Expires February 1997

[Page 15]

For D channel backup, the controlling isdnSignalingTable entry is layered on top of all attached LAPD interfaces. This layering is done using the ifStack table. There is only one active LAPD interface, however. Inactive LAPD interfaces have an ifOperStatus of dormant(5).

NFAS trunks are also handled using the ifStack table. In this case, a signaling channel is layered on top of a LAPD interface as well as on top of all physical interfaces which are controlled by the signaling channel, but do not supply a D channel.

3.4.4. X.25 based packet-mode service in B and D channels

X.25 based packet mode service over B channels can be handled using the Dial Control MIB by creating an appropriate neighbor entry. The neighbor entry ifType can then be x25(5), thus providing access to X.25 service.

X.25 based packet mode service over D channels can be handled by creating an ifEndpointTable entry with an isdnEndpointIfType of x25ple(40). The upper protocol layers can then be attached to this interface using the ifStack table.

3.4.5. SPID handling

Service Profile IDentifiers (SPIDs) are defined for BRI interfaces only, and being used in North America. SPIDs are required for DMS-100, NI-1 and NI-2, and are optional for 5ESS. A switch can define up to 8 SPIDs per BRI.

Each Terminal Endpoint has a SPID assigned. It is normally built from the party number (calling address for outgoing calls) with a number of digits prepended and appended. Since each network appears to be different, both the calling address and the SPID have to be stored.

The SPID identifies the particular services that have been provisioned for a terminal. If there are two B channels on a BRI, there can be two SPIDs, one for each of the two B channels. There can also be a single SPID, providing access to both B channels.

The SPID gets registered with the switch after link establishment. There is one data link for each SPID. As part of terminal registration, an EID (Endpoint IDentifier) is defined by the switch. On incoming calls, the switch may provide the EID, a called party number, or both, depending on the ISDN code implemented in the switch.

The EID has two bytes: USID (User Service IDentifier) and TID (Terminal IDentifier). These are later used by some of the software versions

running on the switch side (e.g. compliant with NI-1, 5ESS custom) to broadcast SETUP messages with these included, so the correct endpoint would accept the call. Other switch software versions identify the

endpoint with the Called Party Number.

In the ISDN MIB, the SPID can be entered using the `isdnEndpointSpid` object of `isdnEndpointTable`. The `isdnSignalingCallingAddress`, already being used to specify the calling number, cannot be used to record the SPID since the values of the SPID and the Calling Address may differ and both may be required to be present.

3.4.6. Closed User Groups

Closed User Groups (CUG), as defined in I.255.1 [14], are supported for circuit mode calls by ETSI (ETS 300 138) and 1TR6. In these networks, an ISDN address can have one or more Closed User Groups assigned. If there is more than one Closed User Group assigned to a given address, one of those is the preferred Closed User Group. For such addresses, only calls from assigned Closed User Groups are accepted by the network.

Thus, Closed User Groups are a parameter for neighbor entries and are defined in the Dial Control MIB. A neighbor entry attached to a Closed User Group has to point to an ISDN interface which is attached to the Closed User Group in question.

3.4.7. Provision of point-to-point line topology

In the ISDN standards, there are two different meanings for the term "point-to-point".

In ISDN standards, the term point-to-point are usually used for data link connections, i.e. layer 2 connections, where each layer 2 connection from the TE to the network is a single point-to-point connection. Multiple connections of this kind may exist on one physical (layer 1) connection, however, and in case of Basic Rate interfaces there may be several TE's connected to one physical line to the network.

The second meaning of "point-to-point" refers to the line topology, i.e. to layer 1 connections. For Primary Rate interfaces, the line topology is always point-to-point. For Basic Rate interfaces, layer 1 point-to-point connections do exist in several countries, usually being used for connecting PBX systems to the network.

The second meaning (layer 1 connections) is what will be referred to as "point-to-point" connection throughout this document.

For Basic Rate interfaces, the `isdnBasicRateTable` object `isdnBasicRateLineTopology` can be used to select the line topology.

Expires February 1997

[Page 17]

3.4.8. Speech and audio bearer capability information elements

The objects speech(2), audio31(6) and audio7(7), as being used in isdnBearerInfoType, refer to the Speech, 3.1 kHz Audio and old 7 kHz Audio (now Multi-use) bearer capabilities for ISDN, as defined in Q.931 [8], chapter 4.5.5, octet 3 of bearer capability information element.

These capabilities are signaling artifices that allow networks to do certain things with the call. It is up to the network to decide what to do.

The Speech Bearer Capability means that speech is being carried over the channel, as in two people talking. This would be POTS-type speech. The network may compress this, encrypt it or whatever it wants with it as long as it delivers POTS quality speech to the other end. In other words, a modem is not guaranteed to work over this connection.

The 3.1 kHz Audio capability indicates that the network carries the 3.1 kHz bandwidth across the network. This would (theoretically) allow modem signals to be carried across the network. In the US, the network automatically enters a capability of 3.1 kHz Audio on calls coming into the ISDN from a POTS network. This capability restricts the network from interfering with the data channel in a way that would corrupt the **3.1 kHz VoiceBand data**.

7 kHz Audio was meant to signal the use of a higher quality audio connection (e.g., music from radio). It was changed to Multi-Use capability to allow it to be used for video-conferencing with fall back to audio.

In some cases, the Speech or 3.1 kHz Bearer Capability provides a 56 kbit/s data path through the network. Therefore, some people are setting up calls with the Speech or 3.1 kHz BC and transmitting 56 kbit/s data over the connection. This is usually to take advantage of favorable tariffs for Speech as opposed to Data.

On the incoming side, the equipment is usually configured to ignore the Bearer Capability and either answer all Speech calls as 56 kbit/s data or to use one Directory Number for real speech and another for data.

3.4.9. Attaching incoming calls to router ports

In ISDN, there are several ways to identify an incoming call and to attach a router port to this call.

- o The call can be identified and attached to a router port using the ISDN Calling Address, that is, the peer ISDN address. Since the peer address is defined in a Dial Control MIB configuration entry

for this peer, this would be the most natural way to attach an incoming call to a router port.

Expires February 1997

[Page 18]

In this configuration, only a single `isdnSignalingTable` entry is required for each physical ISDN interface. Unfortunately, the ISDN Calling Address is not available in all countries and/or switch protocols. Therefore, other means for attaching incoming calls to router ports must be provided.

- o The call can also be identified and attached to a router port using the ISDN Called Address. In this case, a distinct ISDN address or subaddress must be specified for each of the router ports.

This can be accomplished in the ISDN MIB by creating a `isdnSignalingTable` entry for each of the router ports, and by connecting Dial Control MIB neighbor entries to the thereby created interface using the `dialCtlNbrCfgLowerIf` object of `dialCtlNbrCfgTable`.

If this type of router port identification is used in an implementation, it is up to the implementor to decide if there should be distinct TEI values assigned for each of the `isdnSignalingTable` entries. For this reason, the `isdnEndpointTable` permits specifying the same TEI value in multiple entries. It is recommended to use dynamic TEI assignment whenever possible.

The implementor should be aware that this type of configuration requires a lot of configuration work for the customer, since an entry in `isdnSignalingTable` must be created for each of the router ports.

- o Incoming calls can also be identified and attached to router ports using a higher layer functionality, such as PPP authentication. Defining this functionality is outside the scope of this document.

3.4.10. Usage of `isdnMibDirectoryGroup` and `isdnDirectoryTable`

In some switch protocol or PBX implementations, the Called Number Information Element on incoming calls can differ from the Calling Number on outgoing calls. Sometimes, the Called Number can be different for incoming Local Calls, Long Distance Calls and International Calls. For Hunt Groups, the Called Number can be any of the numbers in the Hunt Group.

The `isdnDirectoryTable` can be used to specify all these numbers.

Entries in the `isdnDirectoryTable` are always connected to specific `isdnSignalingTable` entries. No `ifEntry` is created for `isdnDirectoryTable` entries. Therefore, the `isdnDirectoryTable` can not be used to attach incoming calls to router ports. For router port identification, `isdnSignalingTable` entries should be created instead.

Expires February 1997

[Page 19]

4. Definitions

ISDN-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY,
NOTIFICATION-TYPE,
OBJECT-TYPE,
Counter32,
Gauge32,
Integer32
FROM SNMPv2-SMI
DisplayString,
TruthValue,
TimeStamp,
RowStatus,
TestAndIncr,
TEXTUAL-CONVENTION
FROM SNMPv2-TC
MODULE-COMPLIANCE,
OBJECT-GROUP
FROM SNMPv2-CONF
ifIndex,
InterfaceIndex
FROM IF-MIB
IANAifType
FROM IANAifType-MIB
transmission
FROM [RFC1213](#)-MIB;

isdnMib MODULE-IDENTITY

LAST-UPDATED "9608230910Z" -- Aug 23, 1996
ORGANIZATION "IETF ISDN MIB Working Group"
CONTACT-INFO
" Guenter Roeck
Postal: cisco Systems
170 West Tasman Drive
San Jose, CA 95134
U.S.A.
Phone: +1 408 527 3143
E-mail: groeck@cisco.com"
DESCRIPTION
"The MIB module to describe the
management of ISDN interfaces."
::= { transmission 20 }

-- The ISDN hardware interface (BRI or PRI) is represented

```
-- by a media specific ifEntry.  
--  
-- For basic rate lines, the media specifics for the physical interface  
-- is defined in the physical interface group of the ISDN MIB.
```

Expires February 1997

[Page 20]

```
SYNTAX      INTEGER {
    other(1),      -- none of the following
    dss1(2),       -- ITU DSS1 (formerly CCITT) Q.931
    etsi(3),       -- Europe / ETSI ETS300-102
                  -- plus supplementary services
                  -- (ETSI 300-xxx)
                  -- note that NET3, NET5 define
                  -- test procedures for ETS300-102
                  -- and have been replaced by
```

| | |
|-----------|-------------------------|
| dass2(4), | -- I-CTR 3 and I-CTR 4. |
| ess4(5), | -- U.K. / DASS2 (PRI) |
| ess5(6), | -- U.S.A. / AT&T 4ESS |
| | -- U.S.A. / AT&T 5ESS |

Expires February 1997

[Page 21]

```

    dms100(7),      -- U.S.A. / Northern Telecom DMS100
    dms250(8),      -- U.S.A. / Northern Telecom DMS250
    ni1(9),         -- U.S.A. / National ISDN 1 (BRI)
    ni2(10),        -- U.S.A. / National ISDN 2 (BRI, PRI)
    ni3(11),        -- U.S.A. / next one
    vn2(12),        -- France / VN2
    vn3(13),        -- France / VN3
    vn4(14),        -- France / VN4 (ETSI with changes)
    vn6(15),        -- France / VN6 (ETSI with changes)
                    -- delta document CSE P 10-21 A
                    -- test document CSE P 10-20 A
    kdd(16),        -- Japan / KDD
    ins64(17),       -- Japan / NTT INS64
    ins1500(18),     -- Japan / NTT INS1500
    itr6(19),        -- Germany/ 1TR6 (BRI, PRI)
    cornet(20),      -- Germany/ Siemens HiCom CORNET
    ts013(21),       -- Australia / TS013
                    -- (formerly TPH 1962, BRI)
    ts014(22),       -- Australia / TS014
                    -- (formerly TPH 1856, PRI)
    qsig(23),        -- Q.SIG
    swissnet2(24),   -- SwissNet-2
    swissnet3(25)    -- SwissNet-3
}

```

```
-- Isdn Mib objects definitions
```

```
isdnMibObjects OBJECT IDENTIFIER ::= { isdnMib 1 }
```

```
-- ISDN physical interface group
```

```
-- This group describes physical basic rate interfaces.
```

```
isdnBasicRateGroup      OBJECT IDENTIFIER ::= { isdnMibObjects 1 }
```

```
isdnBasicRateTable OBJECT-TYPE
```

```
    SYNTAX      SEQUENCE OF IsdnBasicRateEntry
```

```
    MAX-ACCESS  not-accessible
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "Table containing configuration and operational
        parameters for all physical Basic Rate
        interfaces on this managed device."
```

```
    ::= { isdnBasicRateGroup 1 }
```

```
isdnBasicRateEntry OBJECT-TYPE
```

```
    SYNTAX      IsdnBasicRateEntry
```

```
    MAX-ACCESS  not-accessible
```

STATUS current
DESCRIPTION
 "An entry in the ISDN Basic Rate Table."
INDEX { ifIndex }

Expires February 1997

[Page 22]

```
::= { isdnBasicRateTable 1 }
```

```
IsdnBasicRateEntry ::= SEQUENCE {  
    isdnBasicRateIfType      INTEGER,  
    isdnBasicRateLineTopology INTEGER,  
    isdnBasicRateIfMode      INTEGER,  
    isdnBasicRateSignalMode  INTEGER  
}
```

isdnBasicRateIfType OBJECT-TYPE

```
SYNTAX      INTEGER {  
    isdns(75),  
    isdnu(76)  
}
```

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The physical interface type. For 'S/T' interfaces,
also called 'Four-wire Basic Access Interface',
the value of this object is isdns(75).

For 'U' interfaces, also called 'Two-wire Basic
Access Interface', the value of this object is
isdnu(76)."

```
::= { isdnBasicRateEntry 1 }
```

isdnBasicRateLineTopology OBJECT-TYPE

```
SYNTAX      INTEGER {  
    pointToPoint(1),  
    pointToMultipoint(2)  
}
```

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The line topology to be used for this interface.

Note that setting isdnBasicRateIfType to isdns(75)
does not necessarily mean a line topology of
point-to-multipoint."

```
::= { isdnBasicRateEntry 2 }
```

isdnBasicRateIfMode OBJECT-TYPE

```
SYNTAX      INTEGER {  
    te(1),  
    nt(2)  
}
```

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The physical interface mode. For TE mode, the value

```
      of this object is te(1). For NT mode, the value  
      of this object is nt(2)."  
 ::= { isdnBasicRateEntry 3 }
```

Expires February 1997

[Page 23]

isdnBasicRateSignalMode OBJECT-TYPE

```
SYNTAX      INTEGER {  
    active(1),  
    inactive(2)  
}
```

```
MAX-ACCESS  read-write
```

```
STATUS      current
```

DESCRIPTION

"The signaling channel operational mode for this interface.
If active(1) there is a signaling channel on this
interface. If inactive(2) a signaling channel is
not available."

```
::= { isdnBasicRateEntry 4 }
```

```
-- The B channel (bearer channel) group
```

```
-- Note that disconnects can explicitly be handled using the  
-- ifStack table. If a connection is to be disconnected,  
-- the according ifStack entry has to be removed.  
-- More specifically, the ifStackTable entry which binds the high-layer  
-- ifTable entry (and related dialCtlNbrCfgTable entry) to the  
-- B channel ifTable entry (and related isdnBearerTable entry)  
-- during an active call has to be removed.
```

```
isdnBearerGroup OBJECT IDENTIFIER ::= { isdnMibObjects 2 }
```

isdnBearerTable OBJECT-TYPE

```
SYNTAX      SEQUENCE OF IsdnBearerEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

DESCRIPTION

"This table defines port specific operational, statistics
and active call data for ISDN B channels. Each entry
in this table describes one B (bearer) channel."

```
::= { isdnBearerGroup 1 }
```

isdnBearerEntry OBJECT-TYPE

```
SYNTAX      IsdnBearerEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

DESCRIPTION

"Operational and statistics information relating to
one port. A port is a single B channel."

```
INDEX { ifIndex }
```

```
::= { isdnBearerTable 1 }
```

```
IsdnBearerEntry ::=
```

```
SEQUENCE {
```

| | |
|-------------------------|----------------|
| isdnBearerChannelType | INTEGER, |
| isdnBearerOperStatus | INTEGER, |
| isdnBearerChannelNumber | INTEGER, |
| isdnBearerPeerAddress | DisplayString, |

Expires February 1997

[Page 24]

```
    isdnBearerPeerSubAddress      DisplayString,
    isdnBearerCallOrigin          INTEGER,
    isdnBearerInfoType            INTEGER,
    isdnBearerMultirate           TruthValue,
    isdnBearerCallSetupTime       TimeStamp,
    isdnBearerCallConnectTime     TimeStamp,
    isdnBearerChargedUnits        Gauge32
}
```

```
isdnBearerChannelType          OBJECT-TYPE
    SYNTAX INTEGER {
        dialup(1),
        leased(2)
    }
    MAX-ACCESS read-write
    STATUS current
    DESCRIPTION
        "The B channel type. If the B channel is connected
        to a dialup line, this object has a value of
        dialup(1). In this case, it is controlled by
        an associated signaling channel. If the B channel
        is connected to a leased line, this object has
        a value of leased(2). For leased line B channels, there
        is no signaling channel control available."
    ::= { isdnBearerEntry 1 }
```

```
isdnBearerOperStatus          OBJECT-TYPE
    SYNTAX INTEGER {
        idle(1),
        connecting(2),
        connected(3),
        active(4)
    }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The current call control state for this port.
        idle(1):      The B channel is idle.
                     No call or call attempt is going on.
        connecting(2): A connection attempt (outgoing call)
                     is being made on this interface.
        connected(3):  An incoming call is in the process
                     of validation.
        active(4):     A call is active on this interface."
    ::= { isdnBearerEntry 2 }
```

```
isdnBearerChannelNumber       OBJECT-TYPE
    SYNTAX INTEGER (1..30)
```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The identifier being used by a signaling protocol

Expires February 1997

[Page 25]

to identify this B channel, also referred to as B channel number. If the Agent also supports the DS0 MIB, the values of isdnBearerChannelNumber and dsx0Ds0Number must be identical for a given B channel."

::= { isdnBearerEntry 3 }

isdnBearerPeerAddress OBJECT-TYPE

SYNTAX DisplayString

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The ISDN address the current or last call is or was connected to.

In some cases, the format of this information can not be predicted, since it largely depends on the type of switch or PBX the device is connected to. Therefore, the detailed format of this information is not specified and is implementation dependent.

If possible, the agent should supply this information using the E.164 format. In this case, the number must start with '+'. Otherwise, IA5 number digits must be used.

If the peer ISDN address is not available, this object has a length of zero."

REFERENCE

"ITU-T E.164, Q.931 chapter 4.5.10"

::= { isdnBearerEntry 4 }

isdnBearerPeerSubAddress OBJECT-TYPE

SYNTAX DisplayString

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The ISDN subaddress the current or last call is or was connected to.

The subaddress is an user supplied string of up to 20 IA5 characters and is transmitted transparently through the network.

If the peer subaddress is not available, this object has a length of zero."

REFERENCE

"ITU-T I.330, Q.931 chapter 4.5.11"

::= { isdnBearerEntry 5 }

isdnBearerCallOrigin OBJECT-TYPE

```
SYNTAX  INTEGER {  
    unknown(1),  
    originate(2),
```

Expires February 1997

[Page 26]

```

        answer(3),
        callback(4)
    }
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "The call origin for the current or last call. If since
        system startup there was no call on this interface,
        this object has a value of unknown(1)."
    ::= { isdnBearerEntry 6 }

```

```

isdnBearerInfoType          OBJECT-TYPE
    SYNTAX      INTEGER {
        unknown(1),
        speech(2),
        unrestrictedDigital(3),      -- as defined in Q.931
        unrestrictedDigital56(4),    -- with 56k rate adaption
        restrictedDigital(5),
        audio31(6),                  -- 3.1 kHz audio
        audio7(7),                   -- 7 kHz audio
        video(8),
        packetSwitched(9)
    }
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "The Information Transfer Capability for the current
        or last call.

        speech(2) refers to a non-data connection, whereas
        audio31(6) and audio7(7) refer to data mode connections.

        Note that Q.931, chapter 4.5.5, originally defined
        audio7(7) as '7 kHz audio' and now defines it as
        'Unrestricted digital information with tones/
        announcements'.

        If since system startup there has been no call on this
        interface, this object has a value of unknown(1)."
    REFERENCE
        "Q.931 [8], chapter 4.5.5, octet 3 of bearer capability
        information element, combined with the User Rate
        (as defined in octets 5 and 5a to 5d), if rate adaption
        is being used."
    ::= { isdnBearerEntry 7 }

```

```

isdnBearerMultirate          OBJECT-TYPE
    SYNTAX      TruthValue

```

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This flag indicates if the current or last call used

Expires February 1997

[Page 27]

multirate. The actual information transfer rate, in detail specified in octet 4.1 (rate multiplier), is the sum of all B channel ifSpeed values for the hyperchannel.

If since system startup there was no call on this interface, this object has a value of false(2)."

REFERENCE

"Q.931 [8], chapter 4.5.5."

::= { isdnBearerEntry 8 }

isdnBearerCallSetupTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime when the ISDN setup message for the current or last call was sent or received. If since system startup there has been no call on this interface, this object has a value of zero."

::= { isdnBearerEntry 9 }

isdnBearerCallConnectTime OBJECT-TYPE

SYNTAX TimeStamp

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The value of sysUpTime when the ISDN connect message for the current or last call was sent or received. If since system startup there has been no call on this interface, this object has a value of zero."

::= { isdnBearerEntry 10 }

isdnBearerChargedUnits OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of charged units for the current or last connection. For incoming calls or if charging information is not supplied by the switch, the value of this object is zero."

::= { isdnBearerEntry 11 }

-- ISDN signaling group

isdnSignalingGroup OBJECT IDENTIFIER ::= { isdnMibObjects 3 }

- signaling channel configuration table
- There is one entry in this table for each Terminal Endpoint
- (link layer connection to the switch).
- Usually, there is one endpoint per D channel. In some

```
-- cases, however, there can be multiple endpoints.
-- Thus, entries in this table can be created and deleted.
-- This also means the creation of an associated ifEntry.
--
-- D channel backup and NFAS trunks are handled using the
-- ifStack table.
-- In case of D channel backup, there are multiple
-- Data Link Layer (LAPD) interfaces. Only one interface is
-- active; all others are dormant(5).
-- In case of NFAS trunks, one lower interface is the
-- LAPD interface, while the other lower interfaces are physical
-- interfaces.

-- If directory number and calling address differ from each other
-- or multiple directory numbers are being used,
-- the isdnDirectoryTable has to be used to enter such
-- directory numbers.
```

isdnSignalingGetIndex OBJECT-TYPE

SYNTAX TestAndIncr

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The recommended procedure for selecting a new index for isdnSignalingTable row creation is to GET the value of this object, and then to SET the object with the same value. If the SET operation succeeds, the manager can use this value as an index to create a new row in this table."

REFERENCE

"[RFC1903](#), TestAndIncr textual convention."

::= { isdnSignalingGroup 1 }

isdnSignalingTable OBJECT-TYPE

SYNTAX SEQUENCE OF IsdnSignalingEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"ISDN signaling table containing configuration and operational parameters for all ISDN signaling channels on this managed device."

::= { isdnSignalingGroup 2 }

isdnSignalingEntry OBJECT-TYPE

SYNTAX IsdnSignalingEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the ISDN Signaling Table. To create a new

```
entry, only isdnSignalingProtocol needs to be specified
before isdnSignalingStatus can become active(1)."
```

INDEX { isdnSignalingIndex }

::= { isdnSignalingTable 1 }

```
IsdnSignalingEntry ::= SEQUENCE {  
    isdnSignalingIndex      INTEGER,  
    isdnSignalingIfIndex    InterfaceIndex,  
    isdnSignalingProtocol   IsdnSignalingProtocol,  
    isdnSignalingCallingAddress DisplayString,  
    isdnSignalingSubAddress  DisplayString,  
    isdnSignalingBchannelCount Integer32,  
    isdnSignalingInfoTrapEnable INTEGER,  
    isdnSignalingStatus      RowStatus  
}
```

```
isdnSignalingIndex OBJECT-TYPE  
    SYNTAX      INTEGER (1..2147483647)  
    MAX-ACCESS  not-accessible  
    STATUS      current  
    DESCRIPTION  
        "The index value which uniquely identifies an entry  
        in the isdnSignalingTable."  
    ::= { isdnSignalingEntry 1 }
```

```
isdnSignalingIfIndex OBJECT-TYPE  
    SYNTAX      InterfaceIndex  
    MAX-ACCESS  read-only  
    STATUS      current  
    DESCRIPTION  
        "The ifIndex value of the interface associated with this  
        signaling channel."  
    ::= { isdnSignalingEntry 2 }
```

```
isdnSignalingProtocol OBJECT-TYPE  
    SYNTAX      IsdnSignalingProtocol  
    MAX-ACCESS  read-create  
    STATUS      current  
    DESCRIPTION  
        "The particular protocol type supported by the  
        switch providing access to the ISDN network  
        to which this signaling channel is connected."  
    ::= { isdnSignalingEntry 3 }
```

```
isdnSignalingCallingAddress OBJECT-TYPE  
    SYNTAX      DisplayString  
    MAX-ACCESS  read-create  
    STATUS      current  
    DESCRIPTION  
        "The ISDN Address to be assigned to this signaling  
        channel. More specifically, this is the 'Calling Address  
        information element' as being passed to the switch  
        in outgoing call setup messages."
```

It can be an EAZ (1TR6), a calling number (DSS1, ETSI)
or any other number necessary to identify a signaling
interface. If there is no such number defined or required,

this is a zero length string. It is represented in DisplayString form.

Incoming calls can also be identified by this number. If the Directory Number, i.e. the Called Number in incoming calls, is different to this number, the isdnDirectoryTable has to be used to specify all possible Directory Numbers.

The format of this information largely depends on the type of switch or PBX the device is connected to. Therefore, the detailed format of this information is not specified and is implementation dependent.

If possible, the agent should implement this information using the E.164 number format. In this case, the number must start with '+'. Otherwise, IA5 number digits must be used."

REFERENCE

"ITU-T E.164, Q.931 chapter 4.5.10"

DEFVAL { "" }

::= { isdnSignalingEntry 4 }

isdnSignalingSubAddress OBJECT-TYPE

SYNTAX DisplayString

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Supplementary information to the ISDN address assigned to this signaling channel. Usually, this is the subaddress as defined in Q.931.

If there is no such number defined or required, this is a zero length string.

The subaddress is used for incoming calls as well as for outgoing calls.

The subaddress is an user supplied string of up to 20 IA5 characters and is transmitted transparently through the network."

REFERENCE

"ITU-T I.330, Q.931 chapter 4.5.11"

DEFVAL { "" }

::= { isdnSignalingEntry 5 }

isdnSignalingBchannelCount OBJECT-TYPE

SYNTAX Integer32 (1..65535)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"The total number of B channels (bearer channels) managed by this signaling channel. The default value of this object depends on the physical interface type and is either 2 for Basic Rate interfaces or

24 (30) for Primary Rate interfaces."
::= { isdnSignalingEntry 6 }

isdnSignalingInfoTrapEnable OBJECT-TYPE
SYNTAX INTEGER {
enabled(1),
disabled(2)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Indicates whether isdnMibCallInformation traps
should be generated for calls on this signaling
channel."
DEFVAL { disabled }
::= { isdnSignalingEntry 7 }

isdnSignalingStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This object is used to create and delete rows in the
isdnSignalingTable."
::= { isdnSignalingEntry 8 }

-- Signaling channel statistics table
-- There is one entry for each signaling connection
-- in this table.
-- Note that the ifEntry also has some statistics information.

isdnSignalingStatsTable OBJECT-TYPE
SYNTAX SEQUENCE OF IsdnSignalingStatsEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"ISDN signaling table containing statistics
information for all ISDN signaling channels
on this managed device.
Only statistical information which is not already being
counted in the ifTable is being defined in this table."
::= { isdnSignalingGroup 3 }

isdnSignalingStatsEntry OBJECT-TYPE
SYNTAX IsdnSignalingStatsEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"An entry in the ISDN Signaling statistics Table."
AUGMENTS { isdnSignalingEntry }
::= { isdnSignalingStatsTable 1 }

Expires February 1997

[Page 32]

```
IsdnSignalingStatsEntry ::= SEQUENCE {  
    isdnSigStatsInCalls      Counter32,  
    isdnSigStatsInConnected  Counter32,  
    isdnSigStatsOutCalls     Counter32,  
    isdnSigStatsOutConnected Counter32,  
    isdnSigStatsChargedUnits Counter32  
}
```

```
isdnSigStatsInCalls OBJECT-TYPE  
    SYNTAX      Counter32  
    MAX-ACCESS  read-only  
    STATUS      current  
    DESCRIPTION  
        "The number of incoming calls on this interface."  
    ::= { isdnSignalingStatsEntry 1 }
```

```
isdnSigStatsInConnected OBJECT-TYPE  
    SYNTAX      Counter32  
    MAX-ACCESS  read-only  
    STATUS      current  
    DESCRIPTION  
        "The number of incoming calls on this interface  
        which were actually connected."  
    ::= { isdnSignalingStatsEntry 2 }
```

```
isdnSigStatsOutCalls OBJECT-TYPE  
    SYNTAX      Counter32  
    MAX-ACCESS  read-only  
    STATUS      current  
    DESCRIPTION  
        "The number of outgoing calls on this interface."  
    ::= { isdnSignalingStatsEntry 3 }
```

```
isdnSigStatsOutConnected OBJECT-TYPE  
    SYNTAX      Counter32  
    MAX-ACCESS  read-only  
    STATUS      current  
    DESCRIPTION  
        "The number of outgoing calls on this interface  
        which were actually connected."  
    ::= { isdnSignalingStatsEntry 4 }
```

```
isdnSigStatsChargedUnits OBJECT-TYPE  
    SYNTAX      Counter32  
    MAX-ACCESS  read-only  
    STATUS      current  
    DESCRIPTION  
        "The number of charging units on this interface since
```

system startup.

Only the charging units applying to the local interface,
i.e. for originated calls or for calls with 'Reverse
charging' being active, are counted here."

Expires February 1997

[Page 33]

```
::= { isdnSignalingStatsEntry 5 }
```

```
--
```

```
-- The LAPD table
```

```
isdnLapdTable OBJECT-TYPE
```

```
    SYNTAX      SEQUENCE OF IsdnLapdEntry
```

```
    MAX-ACCESS  not-accessible
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "Table containing configuration and statistics  
        information for all LAPD (D channel Data Link)  
        interfaces on this managed device.
```

```
        Only statistical information which is not already being  
        counted in the ifTable is being defined in this table."
```

```
::= { isdnSignalingGroup 4 }
```

```
isdnLapdEntry OBJECT-TYPE
```

```
    SYNTAX      IsdnLapdEntry
```

```
    MAX-ACCESS  not-accessible
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "An entry in the LAPD Table."
```

```
    INDEX { ifIndex }
```

```
::= { isdnLapdTable 1 }
```

```
IsdnLapdEntry ::= SEQUENCE {
```

```
    isdnLapdPrimaryChannel TruthValue,
```

```
    isdnLapdOperStatus     INTEGER,
```

```
    isdnLapdPeerSabme      Counter32,
```

```
    isdnLapdRecvdFrmr      Counter32
```

```
}
```

```
isdnLapdPrimaryChannel OBJECT-TYPE
```

```
    SYNTAX      TruthValue
```

```
    MAX-ACCESS  read-write
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "If set to true(1), this D channel is the designated  
        primary D channel if D channel backup is active.
```

```
        There must be exactly one primary D channel  
        configured. If D channel backup is not used, this  
        object has a value of true(1)."
```

```
    REFERENCE
```

```
        "Q.931 [8], Annex F, D channel backup procedures."
```

```
::= { isdnLapdEntry 1 }
```

```
isdnLapdOperStatus OBJECT-TYPE
```

```
SYNTAX      INTEGER {  
    inactive(1),  
    l1Active(2),  
    l2Active(3)
```

Expires February 1997

[Page 34]

```
}
MAX-ACCESS    read-only
STATUS        current
DESCRIPTION
    "The operational status of this interface:

        inactive    all layers are inactive
        l1Active    layer 1 is activated,
                     layer 2 datalink not established
        l2Active    layer 1 is activated,
                     layer 2 datalink established."
::= { isdnLapdEntry 2 }
```

```
isdnLapdPeerSabme OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The number of peer SABME frames received on this
         interface. This is the number of peer-initiated
         new connections on this interface."
    ::= { isdnLapdEntry 3 }
```

```
isdnLapdRecvdFrmr OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
        "The number of LAPD FRMR response frames received.
         This is the number of framing errors on this
         interface."
    ::= { isdnLapdEntry 4 }
```

```
--
```

```
-- Optional groups follow here.
```

```
-- The Terminal Endpoint group and table
```

```
-- This table is required only if TEI values or SPID numbers
-- have to be entered.
-- The ifIndex values for this table are identical to those of
-- the isdnSignalingChannel table.
```

```
isdnEndpointGroup OBJECT IDENTIFIER ::= { isdnMibObjects 4 }
```

```
isdnEndpointGetIndex OBJECT-TYPE
    SYNTAX      TestAndIncr
    MAX-ACCESS   read-write
    STATUS      current
```

DESCRIPTION

"The recommended procedure for selecting a new index for
isdEndpointTable row creation is to GET the value of

Expires February 1997

[Page 35]

this object, and then to SET the object with the same value. If the SET operation succeeds, the manager can use this value as an index to create a new row in this table."

REFERENCE

"[RFC1903](#), TestAndIncr textual convention."

::= { isdnEndpointGroup 1 }

isdnEndpointTable OBJECT-TYPE

SYNTAX SEQUENCE OF IsdnEndpointEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table containing configuration for Terminal Endpoints."

::= { isdnEndpointGroup 2 }

isdnEndpointEntry OBJECT-TYPE

SYNTAX IsdnEndpointEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the Terminal Endpoint Table. The value of isdnEndpointIfType must be supplied for a row in this table to become active."

INDEX { isdnEndpointIndex }

::= { isdnEndpointTable 1 }

IsdnEndpointEntry ::= SEQUENCE {

| | |
|----------------------|-----------------|
| isdnEndpointIndex | INTEGER, |
| isdnEndpointIfIndex | InterfaceIndex, |
| isdnEndpointIfType | IANAIfType, |
| isdnEndpointTeiType | INTEGER, |
| isdnEndpointTeiValue | INTEGER, |
| isdnEndpointSpid | DisplayString, |
| isdnEndpointStatus | RowStatus |

}

isdnEndpointIndex OBJECT-TYPE

SYNTAX INTEGER (1..2147483647)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The index value which uniquely identifies an entry in the isdnEndpointTable."

::= { isdnEndpointEntry 1 }

isdnEndpointIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The ifIndex value of the interface associated with this

Expires February 1997

[Page 36]

Terminal Endpoint."
 ::= { isdnEndpointEntry 2 }

isdnEndpointIfType OBJECT-TYPE

SYNTAX IANAIfType
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"The interface type for this Terminal Endpoint.
Interface types of x25ple(40) and isdn(63) are allowed.
The interface type is identical to the value of
ifType in the associated ifEntry."

::= { isdnEndpointEntry 3 }

isdnEndpointTeiType OBJECT-TYPE

SYNTAX INTEGER {
dynamic(1),
static(2)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"The type of TEI (Terminal Endpoint Identifier)
used for this Terminal Endpoint. In case of dynamic(1),
the TEI value is selected by the switch. In
case of static(2), a valid TEI value has to be
entered in the isdnEndpointTeiValue object.
The default value for this object depends on the
interface type as well as the Terminal Endpoint type.
On Primary Rate interfaces the default value is
static(2). On Basic Rate interfaces the default value
is dynamic(1) for isdn(63) Terminal Endpoints and
static(2) for x25ple(40) Terminal Endpoints."

::= { isdnEndpointEntry 4 }

isdnEndpointTeiValue OBJECT-TYPE

SYNTAX INTEGER (0..255)
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"The TEI (Terminal Endpoint Identifier) value
for this Terminal Endpoint. If isdnEndpointTeiType
is set to static(2), valid numbers are 0..63,
while otherwise the value is set internally.
The default value of this object is 0 for static
TEI assignment.
The default value for dynamic TEI assignment is also
0 as long as no TEI has been assigned. After TEI

```
assignment, the assigned TEI value is returned."  
::= { isdnEndpointEntry 5 }
```

isdnEndpointSpid OBJECT-TYPE

Expires February 1997

[Page 37]

SYNTAX DisplayString
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"The Service profile IDentifier (SPID) information
for this Terminal Endpoint.

The SPID is composed of 9-20 numeric characters.

This information has to be defined in addition to
the local number for some switch protocol types,
e.g. Bellcore NI-1 and NI-2.

If this object is not required, it is a
zero length string."

REFERENCE

"Bellcore SR-NWT-001953, Generic Guidelines for ISDN
Terminal Equipment on Basic Access Interfaces,
Chapter 8.5.1."

DEFVAL { "" }

::= { isdnEndpointEntry 6 }

isdnEndpointStatus OBJECT-TYPE

SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION

"This object is used to create and delete rows in the
isdnEndpointTable."

::= { isdnEndpointEntry 7 }

--

-- The Directory Number group

--

isdnDirectoryGroup OBJECT IDENTIFIER ::= { isdnMibObjects 5 }

isdnDirectoryTable OBJECT-TYPE

SYNTAX SEQUENCE OF IsdnDirectoryEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION

"Table containing Directory Numbers."

::= { isdnDirectoryGroup 1 }

isdnDirectoryEntry OBJECT-TYPE

SYNTAX IsdnDirectoryEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"An entry in the Directory Number Table. All objects
in an entry must be set for a new row to become active."

Expires February 1997

[Page 38]

```
INDEX { isdnDirectoryIndex }  
::= { isdnDirectoryTable 1 }
```

```
IsdnDirectoryEntry ::= SEQUENCE {  
    isdnDirectoryIndex      INTEGER,  
    isdnDirectoryNumber     DisplayString,  
    isdnDirectorySigIndex   INTEGER,  
    isdnDirectoryStatus     RowStatus  
}
```

isdnDirectoryIndex OBJECT-TYPE

SYNTAX INTEGER (1..'7fffffff'h)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The index value which uniquely identifies an entry
in the isdnDirectoryTable."

```
::= { isdnDirectoryEntry 1 }
```

isdnDirectoryNumber OBJECT-TYPE

SYNTAX DisplayString

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"A Directory Number. Directory Numbers are used
to identify incoming calls on the signaling
channel given in isdnDirectorySigIndex."

The format of this information largely depends on the type
of switch or PBX the device is connected to. Therefore,
the detailed format of this information is not
specified and is implementation dependent.

If possible, the agent should implement this information
using the E.164 number format. In this case, the number
must start with '+'. Otherwise, IA5 number digits must
be used."

REFERENCE

"ITU-T E.164, Q.931 chapter 4.5.10"

```
::= { isdnDirectoryEntry 2 }
```

isdnDirectorySigIndex OBJECT-TYPE

SYNTAX INTEGER (1..2147483647)

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"An index pointing to an ISDN signaling channel.
Incoming calls are accepted on this

signaling channel if the isdnDirectoryNumber is
presented as Called Number in the SETUP message."
::= { isdnDirectoryEntry 3 }

Expires February 1997

[Page 39]

```
isdnDirectoryStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS   read-create
    STATUS       current
    DESCRIPTION
        "This object is used to create and delete rows in the
         isdnDirectoryTable."
    ::= { isdnDirectoryEntry 4 }

-- Traps

isdnMibTrapPrefix OBJECT IDENTIFIER ::= { isdnMib 2 }
isdnMibTraps OBJECT IDENTIFIER ::= { isdnMibTrapPrefix 0 }

isdnMibCallInformation NOTIFICATION-TYPE
    OBJECTS {
        ifIndex,                      -- isdnBearerTable ifIndex
        isdnBearerOperStatus,
        isdnBearerPeerAddress,
        isdnBearerPeerSubAddress,
        isdnBearerCallSetupTime,
        isdnBearerInfoType,
        isdnBearerCallOrigin
    }
    STATUS       current
    DESCRIPTION
        "This trap/inform is sent to the manager under the
         following conditions:
         - on incoming calls for each call which is rejected for
           policy reasons (e.g. unknown neighbor or access
           violation)
         - on outgoing calls whenever a call attempt is determined
           to have ultimately failed. In the event that call retry
           is active, then this will be after all retry attempts
           have failed.
         - whenever a call connects. In this case, the object
           isdnBearerCallConnectTime should be included in the
           trap.

         Only one such trap is sent in between successful or
         unsuccessful call attempts from or to a single neighbor;
         subsequent call attempts result in no trap.

         If the Dial Control MIB objects dialCtlNbrCfgId and
         dialCtlNbrCfgIndex are known by the entity generating
         this trap, both objects should be included in the trap
         as well. The receipt of this trap with no dial neighbor
         information indicates that the manager must poll the
```

```
callHistoryTable of the Dial Control MIB to see what
changed."
::= { isdnMibTraps 1 }
```

```
--
-- conformance information
--

isdnMibConformance OBJECT IDENTIFIER ::= { isdnMib 2 }
isdnMibCompliances OBJECT IDENTIFIER ::= { isdnMibConformance 1 }
isdnMibGroups      OBJECT IDENTIFIER ::= { isdnMibConformance 2 }

-- compliance statements

isdnMibCompliance MODULE-COMPLIANCE
    STATUS          current
    DESCRIPTION
        "The compliance statement for entities which implement
        the ISDN MIB."
    MODULE          -- this module

-- unconditionally mandatory groups
    MANDATORY-GROUPS {
        isdnMibSignalingGroup,
        isdnMibBearerGroup
    }

-- conditionally mandatory group
    GROUP          isdnMibBasicRateGroup
    DESCRIPTION
        "The isdnMibBasicRateGroup is mandatory for entities
        supporting ISDN Basic Rate interfaces."

-- optional groups
    GROUP          isdnMibEndpointGroup
    DESCRIPTION
        "Implementation of this group is optional for all systems
        that attach to ISDN interfaces."

    GROUP          isdnMibDirectoryGroup
    DESCRIPTION
        "Implementation of this group is optional for all systems
        that attach to ISDN interfaces."

    OBJECT          isdnBasicRateIfType
    MIN-ACCESS      read-only
    DESCRIPTION
        "It is conformant to implement this object as read-only."

    OBJECT          isdnBasicRateLineTopology
    MIN-ACCESS      read-only
    DESCRIPTION
        "It is conformant to implement this object as read-only."
```

OBJECT isdnBasicRateIfMode
MIN-ACCESS read-only

Expires February 1997

[Page 41]

DESCRIPTION

"It is conformant to implement this object as read-only."

OBJECT isdnBasicRateSignalMode

MIN-ACCESS read-only

DESCRIPTION

"It is conformant to implement this object as read-only."

::= { isdnMibCompliances 1 }

-- units of conformance

isdnMibBasicRateGroup OBJECT-GROUP

OBJECTS {

isdnBasicRateIfType,
isdnBasicRateLineTopology,
isdnBasicRateIfMode,
isdnBasicRateSignalMode

}

STATUS current

DESCRIPTION

"A collection of objects required for ISDN Basic Rate
physical interface configuration and statistics."

::= { isdnMibGroups 1 }

isdnMibBearerGroup OBJECT-GROUP

OBJECTS {

isdnBearerChannelType,
isdnBearerOperStatus,
isdnBearerChannelNumber,
isdnBearerPeerAddress,
isdnBearerPeerSubAddress,
isdnBearerCallOrigin,
isdnBearerInfoType,
isdnBearerMultirate,
isdnBearerCallSetupTime,
isdnBearerCallConnectTime,
isdnBearerChargedUnits

}

STATUS current

DESCRIPTION

"A collection of objects required for ISDN Bearer channel
control and statistics."

::= { isdnMibGroups 2 }

isdnMibSignalingGroup OBJECT-GROUP

OBJECTS {

isdnSignalingGetIndex,

isdnSignalingIfIndex,
isdnSignalingProtocol,
isdnSignalingCallingAddress,
isdnSignalingSubAddress,

Expires February 1997

[Page 42]

```
    isdnSignalingBchannelCount,
    isdnSignalingInfoTrapEnable,
    isdnSignalingStatus,
    isdnSigStatsInCalls,
    isdnSigStatsInConnected,
    isdnSigStatsOutCalls,
    isdnSigStatsOutConnected,
    isdnSigStatsChargedUnits,
    isdnLapdPrimaryChannel,
    isdnLapdOperStatus,
    isdnLapdPeerSabme,
    isdnLapdRecvdFrmr
}
STATUS      current
DESCRIPTION
    "A collection of objects required for ISDN D channel
    configuration and statistics."
::= { isdnMibGroups 3 }
```

```
isdnMibEndpointGroup OBJECT-GROUP
    OBJECTS {
        isdnEndpointGetIndex,
        isdnEndpointIfIndex,
        isdnEndpointIfType,
        isdnEndpointTeiType,
        isdnEndpointTeiValue,
        isdnEndpointSpid,
        isdnEndpointStatus
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects describing Terminal Endpoints."
    ::= { isdnMibGroups 4 }
```

```
isdnMibDirectoryGroup OBJECT-GROUP
    OBJECTS {
        isdnDirectoryNumber,
        isdnDirectorySigIndex,
        isdnDirectoryStatus
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects describing directory numbers."
    ::= { isdnMibGroups 5 }
```

END

Expires February 1997

[Page 43]

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Aspects Rec. Q.920.

Expires February 1997

[Page 44]

- [6] ITU-T Recommendation "Digital subscriber Signaling System No. 1 (DSS 1) - ISDN User-Network Interface - Data Link Layer Specification Rec. Q.921.
- [7] ITU-T Recommendation "Digital subscriber Signaling System No. 1 (DSS 1) - ISDN Data Link Layer Specification for Frame Mode Bearer Services (LAPF) Rec. Q.922.
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- [15] G. Roeck, "Dial Control Management Information Base", RFCxxxx, cisco Systems, June 1996.

[7.](#) Security Considerations

Security issues are not discussed in this memo.

Expires February 1997

[Page 45]

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Expires February 1997

[Page 46]