Network Working Group
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Definitions of Managed Objects for Parallel-printer-like Hardware Devices

Status of this Memo

This document specifies an IAB standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "IAB Official Protocol Standards" for the standardization state and status of this protocol. Distribution of this memo is unlimited.

1. Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in TCP/IP based internets. In particular, it defines objects for the management of parallel-printer-like devices.

2. The Network Management Framework

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

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

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

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

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

3. Objects

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB.

Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) [7] defined in the SMI. In particular, each object has a name, a syntax, and an encoding. The name is an object identifier, an administratively assigned name, which specifies an object type.

The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the OBJECT DESCRIPTOR, to also refer to the object type.

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

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

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

3.1. Format of Definitions

Section 5 contains the specification of all object types contained in this MIB module. The object types are defined using the conventions defined in the SMI, as amended by the extensions specified in [9,10].

4. Overview

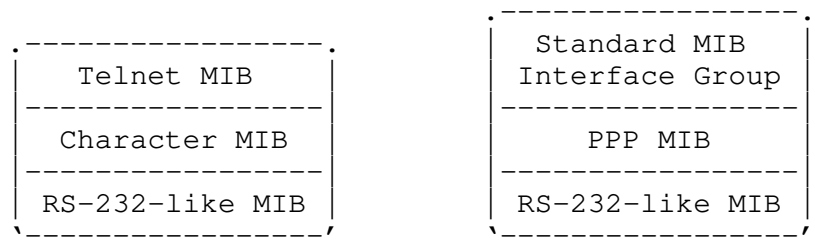
The Parallel-printer-like Hardware Device MIB applies to interface ports that might logically support the Interface MIB, a Transmission MIB, or the Character MIB (most likely the latter). The most common example is a Centronics or Data Products type parallel printer port.

The Parallel-printer-like MIB is one of a set of MIBs designed for complementary use. At this writing, the set comprises:

Character MIB
PPP MIB
RS-232-like MIB
Parallel-printer-like MIB

The RS-232-like MIB and the Parallel-printer-like MIB represent the physical layer, providing service to higher layers such as the Character MIB or PPP MIB. Further MIBs may appear above these.

The following diagram shows two possible "MIB stacks", each using the RS-232-like MIB.



The intent of the model is for the physical-level MIBs to represent the lowest level, regardless of the higher level that may be using it. In turn, separate higher level MIBs represent specific applications, such as a terminal (the Character MIB) or a network connection (the PPP MIB).

The Parallel-printer-like MIB is mandatory for all systems that have such a hardware port supporting services managed through some other MIB, for example, the Character MIB.

The Parallel-printer-like MIB includes multiple similar types of hardware, and as a result contains objects not applicable to all of those types. Such objects are in a separate branch of the MIB, which is required when applicable and otherwise absent.

The Parallel-printer-like MIB includes Centronics, Data Products, and other parallel physical links with a similar set of control signals.

The MIB contains objects that relate to physical layer connections. Such connections may provide interesting hardware signals (other than for basic data transfer), such as Power and PaperOut.

The MIB comprises one base object and three tables, detailed

in the following sections. The tables contain objects for ports and input and output control signals.

5. Definitions

```
                RFC1318-MIB DEFINITIONS ::= BEGIN

                IMPORTS
                        Counter
                                FROM RFC1155-SMI
                        transmission
                                FROM RFC1213-MIB
                        OBJECT-TYPE
                                FROM RFC-1212;

        -- this is the MIB module for Parallel-printer-like
        -- hardware devices

        para    OBJECT IDENTIFIER ::= { transmission 34 }

        -- the generic Parallel-printer-like group

        -- Implementation of this group is mandatory for all
        -- systems that have Parallel-printer-like hardware
        -- ports supporting higher level services such as
        -- character streams

        paraNumber OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                "The number of ports (regardless of their current
                state) in the Parallel-printer-like port table."
            ::= { para 1 }


        -- the Parallel-printer-like Port table

        paraPortTable OBJECT-TYPE
            SYNTAX SEQUENCE OF ParaPortEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                "A list of port entries.  The number of entries is
                given by the value of paraNumber."
            ::= { para 2 }
```

```
paraPortEntry OBJECT-TYPE
    SYNTAX ParaPortEntry
    ACCESS not-accessible
    STATUS mandatory
    DESCRIPTION
        "Status and parameter values for a port."
    INDEX { paraPortIndex }
    ::= { paraPortTable 1 }

ParaPortEntry ::=
    SEQUENCE {
        paraPortIndex
            INTEGER,
        paraPortType
            INTEGER,
        paraPortInSigNumber
            INTEGER,
        paraPortOutSigNumber
            INTEGER
    }

paraPortIndex OBJECT-TYPE
    SYNTAX INTEGER
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "A unique value for each port.  Its value ranges
        between 1 and the value of paraNumber.  By
        convention and if possible, hardware port numbers
        map directly to external connectors.  The value for
        each port must remain constant at least from one
        re-initialization of the network management agent to
        the next."
    ::= { paraPortEntry 1 }

paraPortType OBJECT-TYPE
    SYNTAX INTEGER {
        other(1),
        centronics(2),
        dataproducts(3)
    }
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The port's hardware type."
    ::= { paraPortEntry 2 }

paraPortInSigNumber OBJECT-TYPE
```

```
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                "The number of input signals for the port in the
                input signal table (paraPortInSigTable).  The table
                contains entries only for those signals the software
                can detect."
            ::= { paraPortEntry 3 }

        paraPortOutSigNumber OBJECT-TYPE
            SYNTAX INTEGER
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                "The number of output signals for the port in the
                output signal table (paraPortOutSigTable).  The
                table contains entries only for those signals the
                software can assert."
            ::= { paraPortEntry 4 }


        -- the Input Signal table

        paraInSigTable OBJECT-TYPE
            SYNTAX SEQUENCE OF ParaInSigEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                "A list of port input control signal entries."
            ::= { para 3 }

        paraInSigEntry OBJECT-TYPE
            SYNTAX ParaInSigEntry
            ACCESS not-accessible
            STATUS mandatory
            DESCRIPTION
                "Input control signal status for a hardware port."
            INDEX { paraInSigPortIndex, paraInSigName }
            ::= { paraInSigTable 1 }

        ParaInSigEntry ::=
            SEQUENCE {
                paraInSigPortIndex
                    INTEGER,
                paraInSigName
                    INTEGER,
                paraInSigState
```

```
                INTEGER,
            paraInSigChanges
                Counter
        }

    paraInSigPortIndex OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The value of paraPortIndex for the port to which
            this entry belongs."
        ::= { paraInSigEntry 1 }

    paraInSigName OBJECT-TYPE
        SYNTAX INTEGER { power(1), online(2), busy(3),
                         paperout(4), fault(5) }
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "Identification of a hardware signal."
        ::= { paraInSigEntry 2 }

    paraInSigState OBJECT-TYPE
        SYNTAX INTEGER { none(1), on(2), off(3) }
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The current signal state."
        ::= { paraInSigEntry 3 }

    paraInSigChanges OBJECT-TYPE
        SYNTAX Counter
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The number of times the signal has changed from
            'on' to 'off' or from 'off' to 'on'."
        ::= { paraInSigEntry 4 }


    -- the Output Signal table

    paraOutSigTable OBJECT-TYPE
        SYNTAX SEQUENCE OF ParaOutSigEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
```

```
            "A list of port output control signal entries."
        ::= { para 4 }

    paraOutSigEntry OBJECT-TYPE
        SYNTAX ParaOutSigEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
            "Output control signal status for a hardware port."
        INDEX { paraOutSigPortIndex, paraOutSigName }
        ::= { paraOutSigTable 1 }

    ParaOutSigEntry ::=
        SEQUENCE {
            paraOutSigPortIndex
                INTEGER,
            paraOutSigName
                INTEGER,
            paraOutSigState
                INTEGER,
            paraOutSigChanges
                Counter
        }

    paraOutSigPortIndex OBJECT-TYPE
        SYNTAX INTEGER
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The value of paraPortIndex for the port to which
            this entry belongs."
        ::= { paraOutSigEntry 1 }

    paraOutSigName OBJECT-TYPE
        SYNTAX INTEGER { power(1), online(2), busy(3),
                         paperout(4), fault(5) }
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "Identification of a hardware signal."
        ::= { paraOutSigEntry 2 }

    paraOutSigState OBJECT-TYPE
        SYNTAX INTEGER { none(1), on(2), off(3) }
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
            "The current signal state."
```

```
            ::= { paraOutSigEntry 3 }

        paraOutSigChanges OBJECT-TYPE
            SYNTAX Counter
            ACCESS read-only
            STATUS mandatory
            DESCRIPTION
                "The number of times the signal has changed from
                'on' to 'off' or from 'off' to 'on'."
            ::= { paraOutSigEntry 4 }

        END
```

6. Acknowledgements

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7. References

[1] Cerf, V., "IAB Recommendations for the Development of Internet Network Management Standards", RFC 1052, NRI, April 1988.

[2] Cerf, V., "Report of the Second Ad Hoc Network Management Review Group", RFC 1109, NRI, August 1989.

[3] 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.

[4] McCloghrie K., and M. Rose, "Management Information Base for Network Management of TCP/IP-based internets", RFC 1156, Hughes LAN Systems, Performance Systems International, May 1990.

[5] 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.

[6] McCloghrie K., and M. Rose, Editors, "Management Information Base for Network Management of TCP/IP-based internets", RFC 1213, Performance Systems International, March 1991.

[7] Information processing systems - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1), International Organization for Standardization, International Standard 8824, December 1987.

[8] Information processing systems - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Notation One (ASN.1), International Organization for Standardization, International Standard 8825, December 1987.

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

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

8. Security Considerations

Security issues are not discussed in this memo.

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