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X.500 Directory Monitoring MIB

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Abstract

This document defines a portion of the Management Information Base (MIB). It defines the MIB for monitoring Directory System Agents (DSA), a component of the OSI Directory. This MIB will be used in conjunction with the APPLICATION-MIB for monitoring DSAs.

Table of Contents

1. The SNMPv2 Network Management Framework

The major components of the SNMPv2 Network Management framework are described in the documents listed below.

- RFC 1442 [1] defines the Structure of Management Information (SMI), the mechanisms used for describing and naming objects for the purpose of management.

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

- o RFC 1445 [3] defines the administrative and other architectural aspects of the management framework.

- o RFC 1448 [4] defines the protocol used for network access to managed objects.

The framework is adaptable/extensible by defining new MIBs to suit the requirements of specific applications/protocols/situations.

Managed objects are accessed via a virtual information store, the 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, which is 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, often a textual string, termed the descriptor, is used to refer to the object type.

2. MIB Model for DSA Management

A DSA-manager may wish to monitor several aspects of the operational DSA. He/she may want to know the process related aspects-the resource utilization of the operational DSA; the network service related aspects e.g., inbound-associations, outbound-associations, operational status, and finally the information specific to the DSA application - its operations and performance.

The MIB defined in this document covers the portion which is specific to the DSA-application. The network service related part of the MIB, and the host-resources related part of the MIB, as well other parts of interest to a Manager monitoring the DSA-application, are covered in separate documents [6] [7].

3. The DSA functions and operations

The Directory System Agent [DSA], a component of the OSI-Directory [5] [9], is an application process. It provides access to the Directory Information Base [DIB] to Directory User Agents [DUA] and/or other DSAs. Functionally , a User [DUA] and the Directory are bound together for a period of time at an access point to the Directory [DSA]. A DSA may use information stored in its local database or interact with (chain the request to) other DSAs to service requirements. Alternatively, a DSA may return a reference to another DSA.

The local database of a DSA consists of the part of the DIT that is mastered by the DSA, the part of the DIT for which it keeps slave copies and cached information that is gathered during the operation

of the DSA.

The specific operations carried out by the DSA are: Read, Compare, AddEntry, ModifyEntry, ModifyRDN, RemoveEntry, List, Search. There is also the special operation Abandon. In response to requests results and/or errors are returned by the DSA.

4. MIB design

The basic principle has been to keep the MIB as simple as possible. The Managed objects included in the MIB are divided into three tables - dsaOpsTable, dsaEntryTable and dsaIntTable.

- The dsaOpsTable provides summary statistics on the accesses, operations and errors.

- The dsaEntriesTable provides summary statistics on the entries held by the DSA and on cache performance.

- The dsaIntTable provides some useful information on the interaction of the monitored DSA with peer DSAs.

There are references to the Directory itself for static information pertaining to the DSA. These references are in the form of "Directory Distinguished Name" [8] of the corresponding object. It is intended that DSA management applications will use these references to obtain further related information on the objects of interest.

5. The Directory Monitoring MIB

```
DSA-MIB DEFINITIONS ::= BEGIN

        IMPORTS
          MODULE-IDENTITY,  OBJECT-TYPE,
          NOTIFICATION-TYPE
                      FROM SNMPv2-SMI
          DisplayString,    TimeStamp,
          TEXTUAL-CONVENTION
                      FROM SNMPv2-TC
          mib-2
                      FROM RFC1213-MIB
          applIndex, DistinguishedName
                      FROM APPLICATION-MIB;

        dsaMIB MODULE-IDENTITY
           LAST-UPDATED "9311250000Z"
           ORGANIZATION "IETF Mail and Directory Management Working
                         Group"
```

```
          CONTACT-INFO
            "        Glenn Mansfield

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                     6-6-3, Minami Yoshinari
                     Aoba-ku, Sendai, 989-32
                     JP

             Tel:    +81 22 279 3310
             Fax:    +81 22 279 3640
             E-Mail: glenn@aic.co.jp"
         DESCRIPTION
            " The MIB module for monitoring Directory System Agents."
         ::= { mib-2 29 }


        dsaOpsTable OBJECT-TYPE
            SYNTAX SEQUENCE OF DsaOpsEntry
            MAX-ACCESS not-accessible
            STATUS current
            DESCRIPTION
              " The table holding information related to the
                DSA operations."
            ::= {dsaMIB 1}

        dsaOpsEntry OBJECT-TYPE
            SYNTAX DsaOpsEntry
            MAX-ACCESS not-accessible
            STATUS current
            DESCRIPTION
              " Entry containing operations related statistics
                for a DSA."
            INDEX { applIndex }
            ::= {dsaOpsTable 1}

        DsaOpsEntry ::= SEQUENCE {

 -- Bindings
            dsaAnonymousBinds
                Counter32,
            dsaUnauthBinds
                Counter32,
            dsaSimpleAuthBinds
                Counter32,
            dsaStrongAuthBinds
                Counter32,
            dsaBindSecurityErrors
                Counter32,
```

```
 -- In-coming operations

            dsaInOps
                Counter32,
            dsaReadOps
                Counter32,
            dsaCompareOps
                Counter32,
            dsaAddEntryOps
                Counter32,
            dsaRemoveEntryOps
                Counter32,
            dsaModifyEntryOps
                Counter32,
            dsaModifyRDNOps
                Counter32,
            dsaListOps
                Counter32,
            dsaSearchOps
                Counter32,
            dsaOneLevelSearchOps
                Counter32,
            dsaWholeTreeSearchOps
                Counter32,

 -- Out going operations

            dsaReferrals
                Counter32,
            dsaChainings
                Counter32,

 -- Errors

            dsaSecurityErrors
                Counter32,
            dsaErrors
                Counter32
        }

        dsaAnonymousBinds OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of anonymous  binds to this DSA from DUAs
                since application start."
            ::= {dsaOpsEntry 1}
```

```
        dsaUnauthBinds OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of un-authenticated binds to this
                DSA since application start."
            ::= {dsaOpsEntry 2}

        dsaSimpleAuthBinds OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of binds to this DSA that were authenticated
                using simple authentication procedures since
                application start."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 8.1.2.1.1."
            ::= {dsaOpsEntry 3}


        dsaStrongAuthBinds OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of binds to this DSA that were authenticated
                using the strong authentication procedures since
                application start. This includes the binds that were
                authenticated using external authentication procedures."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Sections 8.1.2.1.2 &  8.1.2.1.3."
            ::= {dsaOpsEntry 4}

        dsaBindSecurityErrors OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of bind operations that have been rejected
                by this DSA due to inappropriateAuthentication or
                invalidCredentials."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 12.7.2"
```

```
            ::= {dsaOpsEntry 5}

        dsaInOps OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of operations forwarded to this DSA
                from DUAs or other DSAs since application
                start up."
            ::= {dsaOpsEntry 6}

        dsaReadOps OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of read operations serviced by
                this DSA since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 9.1."
            ::= {dsaOpsEntry 7}

        dsaCompareOps OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of compare operations serviced by
                this DSA  since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 9.2."
            ::= {dsaOpsEntry 8}

        dsaAddEntryOps OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of addEntry operations serviced by
                this DSA since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 11.1."
            ::= {dsaOpsEntry 9}
```

```
        dsaRemoveEntryOps OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of removeEntry operations serviced by
                this DSA since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 11.2."
            ::= {dsaOpsEntry 10}

        dsaModifyEntryOps OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of modifyEntry operations serviced by
                this DSA since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 11.3."
            ::= {dsaOpsEntry 11}

        dsaModifyRDNOps OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of modifyRDN operations serviced by
                this DSA since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 11.4."
            ::= {dsaOpsEntry 12}

        dsaListOps OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of list operations serviced by
                this DSA since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 10.1."
            ::= {dsaOpsEntry 13}
```

```
        dsaSearchOps OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of search operations- baseObjectSearches,
                oneLevelSearches and  subTreeSearches, serviced
                by this DSA  since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 10.2."
            ::= {dsaOpsEntry 14}

        dsaOneLevelSearchOps OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of oneLevelSearch operations serviced
                by this DSA since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 10.2.2.2."
            ::= {dsaOpsEntry 15}

        dsaWholeTreeSearchOps   OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of wholeTreeSearch operations serviced
                by this DSA since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 10.2.2.2."
            ::= {dsaOpsEntry 16}

        dsaReferrals OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of referrals returned by this DSA in response
                to requests for operations since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 12.6."
            ::= {dsaOpsEntry 17}
```

```
        dsaChainings OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of operations forwarded by this DSA
                to other DSAs since application startup."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.518, 1988:
                Section 14."
            ::= {dsaOpsEntry 18}

        dsaSecurityErrors OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of operations forwarded to this DSA
                which did not meet the security requirements. "
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Section 12.7."
            ::= {dsaOpsEntry 19}

        dsaErrors        OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of operations that could not be serviced
                due to errors other than security errors, and
                referrals.
                A partially serviced operation will not be counted
                as an error.
                The errors include NameErrors, UpdateErrors, Attribute
                errors and ServiceErrors."
            REFERENCE
              " CCITT Blue Book Fascicle VIII.8 - Rec. X.511, 1988:
                Sections 12.4, 12.5, 12.8 & 12.9."
            ::= {dsaOpsEntry 20}

 -- Entry statistics/Cache performance
        dsaEntriesTable OBJECT-TYPE
            SYNTAX SEQUENCE OF DsaEntriesEntry
            MAX-ACCESS not-accessible
            STATUS current
            DESCRIPTION
              " The table holding information related to the
```

```
            entry statistics and cache performance of the DSAs."
        ::= {dsaMIB 2}

    dsaEntriesEntry OBJECT-TYPE
        SYNTAX DsaEntriesEntry
        MAX-ACCESS not-accessible
        STATUS current
        DESCRIPTION
          " Entry containing statistics pertaining to entries
            held by a DSA."
        INDEX { applIndex }
        ::= {dsaEntriesTable 1}

    DsaEntriesEntry ::= SEQUENCE {
        dsaMasterEntries
            Gauge32,
        dsaCopyEntries
            Gauge32,
        dsaCacheEntries
            Gauge32,
        dsaCacheHits
            Counter32,
        dsaSlaveHits
            Counter32
    }

    dsaMasterEntries OBJECT-TYPE
        SYNTAX Gauge32
        MAX-ACCESS read-only
        STATUS current
        DESCRIPTION
          " Number of entries mastered in the DSA."
        ::= {dsaEntriesEntry 1}

    dsaCopyEntries OBJECT-TYPE
        SYNTAX Gauge32
        MAX-ACCESS read-only
        STATUS current
        DESCRIPTION
          " Number of entries for which systematic (slave)
            copies are maintained in the DSA."
        ::= {dsaEntriesEntry 2}

    dsaCacheEntries OBJECT-TYPE
        SYNTAX Gauge32
        MAX-ACCESS read-only
        STATUS current
        DESCRIPTION
```

```
              " Number of entries cached (non-systematic copies) in
                the DSA. This will include the entries that are
                cached partially. The negative cache is not counted."
            ::= {dsaEntriesEntry 3}

        dsaCacheHits OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of operations that were serviced from
                the locally held cache since application
                startup."
            ::= {dsaEntriesEntry 4}

        dsaSlaveHits  OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Number of operations that were serviced from
                the locally held object replications [ shadow
                entries] since application startup."
            ::= {dsaEntriesEntry 5}


 -- The dsaIntTable contains statistical data on the peer DSAs
 -- with which the monitored DSAs [attempt to] interact.  This
 -- table  will provide a useful insight into  the   effect of
 -- neighbours on the DSA performance.
 -- The table keeps track of the last "N" DSAs with which  the
 -- monitored  DSAs  has  interacted  [attempted to interact],
 -- where "N" is a locally-defined constant.

          dsaIntTable OBJECT-TYPE
                  SYNTAX  SEQUENCE OF DsaIntEntry
                  MAX-ACCESS  not-accessible
                  STATUS  current
                  DESCRIPTION
                    " Each row of this table contains some details
                      related to the history of the interaction
                      of the monitored DSAs with their respective
                      peer DSAs."
                  ::= { dsaMIB 3 }

          dsaIntEntry OBJECT-TYPE
                  SYNTAX  DsaIntEntry
                  MAX-ACCESS  not-accessible
```

```
                STATUS  current
                DESCRIPTION
                  " Entry containing interaction details of a DSA
                    with a peer DSA."
                INDEX { applIndex,dsaIntIndex }
                ::= { dsaIntTable 1 }

          DsaIntEntry ::= SEQUENCE {
              dsaIntIndex
                  INTEGER,
              dsaName
                  DistinguishedName,
              dsaTimeOfCreation
                  TimeStamp,
              dsaTimeOfLastAttempt
                  TimeStamp,
              dsaTimeOfLastSuccess
                  TimeStamp,
              dsaFailuresSinceLastSuccess
                  Counter32,
              dsaFailures
                  Counter32,
              dsaSuccesses
                  Counter32
          }

        dsaIntIndex  OBJECT-TYPE
            SYNTAX INTEGER (1..2147483647)
            MAX-ACCESS not-accessible
            STATUS current
            DESCRIPTION
              " Together with applIndex it forms the unique key to
                identify the conceptual row which contains useful info
                on the (attempted) interaction between the DSA (referred
                to by applIndex) and a peer DSA."
            ::= {dsaIntEntry 1}

        dsaName  OBJECT-TYPE
            SYNTAX DistinguishedName
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Distinguished Name of the peer DSA to which this
                entry pertains."
            ::= {dsaIntEntry 2}

        dsaTimeOfCreation  OBJECT-TYPE
            SYNTAX TimeStamp
```

```
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " The value of sysUpTime when this row was created.
                If the entry was created before the network management
                subsystem was initialized, this object will contain
                a value of zero."
            ::= {dsaIntEntry 3}

        dsaTimeOfLastAttempt  OBJECT-TYPE
            SYNTAX TimeStamp
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " The value of sysUpTime when the last attempt was made
                to contact this DSA. If the last attempt was made before
                the network management subsystem was initialized, this
                object will contain a value of zero."
            ::= {dsaIntEntry 4}

        dsaTimeOfLastSuccess  OBJECT-TYPE
            SYNTAX TimeStamp
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " The value of sysUpTime when the last attempt made to
                contact this DSA was successful. If there have
                been no successful attempts this entry will have a value
                of zero. If the last successful attempt was made before
                the network management subsystem was initialized, this
                object will contain a value of zero."
            ::= {dsaIntEntry 5}

        dsaFailuresSinceLastSuccess  OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " The number of failures since the last time an
                attempt to contact this DSA was successful. If
                there has been no successful attempts, this counter
                will contain the number of failures since this entry
                was created."
            ::= {dsaIntEntry 6}

        dsaFailures  OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
```

```
            STATUS current
            DESCRIPTION
              " Cumulative failures since the creation of
                this entry."
            ::= {dsaIntEntry 7}

        dsaSuccesses  OBJECT-TYPE
            SYNTAX Counter32
            MAX-ACCESS read-only
            STATUS current
            DESCRIPTION
              " Cumulative successes since the creation of
                this entry."
            ::= {dsaIntEntry 8}


 -- Conformance information

        dsaConformance OBJECT IDENTIFIER ::= { dsaMIB 4 }

        dsaGroups      OBJECT IDENTIFIER ::= { dsaConformance 1 }
        dsaCompliances OBJECT IDENTIFIER ::= { dsaConformance 2 }

 -- Compliance statements

        dsaOpsCompliance MODULE-COMPLIANCE
            STATUS  current
            DESCRIPTION
                    "The compliance statement for SNMPv2 entities
                    which implement the DSA-MIB for monitoring
                    DSA operations."

            MODULE  -- this module
                MANDATORY-GROUPS { dsaOpsGroup }

            ::= { dsaCompliances 1 }

        dsaEntryCompliance MODULE-COMPLIANCE
            STATUS  current
            DESCRIPTION
                    "The compliance statement for SNMPv2 entities
                    which implement the DSA-MIB for monitoring
                    DSA operations,  entry statistics and cache
                    performance."

            MODULE  -- this module
                MANDATORY-GROUPS { dsaOpsGroup,dsaEntryGroup }
```

```
            ::= { dsaCompliances 2 }

        dsaIntCompliance MODULE-COMPLIANCE
            STATUS  current
            DESCRIPTION
                    " The compliance statement  for SNMPv2  entities
                      which implement the DSA-MIB for monitoring DSA
                      operations and the interaction of the DSA with
                      peer DSAs."

            MODULE  -- this module
                MANDATORY-GROUPS { dsaOpsGroup, dsaIntGroup }

            ::= { dsaCompliances 3 }


 -- Units of conformance

        dsaOpsGroup    OBJECT-GROUP
            OBJECTS {
              dsaAnonymousBinds,  dsaUnauthBinds,       dsaSimpleAuthBinds,
              dsaStrongAuthBinds, dsaBindSecurityErrors,dsaInOps,
              dsaReadOps,         dsaCompareOps,        dsaAddEntryOps,
              dsaRemoveEntryOps,  dsaModifyEntryOps,    dsaModifyRDNOps,
              dsaListOps,         dsaSearchOps,         dsaOneLevelSearchOps,
              dsaWholeTreeSearchOps,dsaReferrals,       dsaChainings,
              dsaSecurityErrors,  dsaErrors}
            STATUS  current
            DESCRIPTION
                    " A collection of objects for monitoring the DSA
                      operations."
            ::= { dsaGroups 1 }

        dsaEntryGroup    OBJECT-GROUP
            OBJECTS {dsaMasterEntries,   dsaCopyEntries,       dsaCacheEntries,
                     dsaCacheHits,       dsaSlaveHits}
            STATUS  current
            DESCRIPTION
                    " A collection of objects for monitoring the DSA
                      entry statistics and cache performance."
            ::= { dsaGroups 2 }

        dsaIntGroup    OBJECT-GROUP
            OBJECTS {
              dsaName,             dsaTimeOfCreation, dsaTimeOfLastAttempt,
              dsaTimeOfLastSuccess,dsaFailuresSinceLastSuccess,dsaFailures,
              dsaSuccesses}
            STATUS  current
```

```
            DESCRIPTION
                    " A collection of objects for monitoring the DSA's
                      interaction with peer DSAs."
            ::= { dsaGroups 3 }


END
```

6. Acknowledgements

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ietf-madman-wg	ietf-madman@innosoft.com
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wide-netman-wg	netman-wg@wide.ad.jp

7. References

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[3] Galvin, J., and K. McCloghrie, "Administrative Model for version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1445, Trusted Information Systems, Hughes LAN Systems, April 1993.

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Security Considerations

Security issues are not discussed in this memo.

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