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B. Fenner
AT&T Labs - Research
J. Flick
Hewlett-Packard Company

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Management Information Base for the User Datagram Protocol (UDP)

Status of This Memo

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects used for implementations of the User Datagram Protocol (UDP) in an IP version independent manner. This memo obsoletes RFCs 2013 and 2454.

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1. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIv2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

2. Overview

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes managed objects used for implementations of the User Datagram Protocol (UDP), as defined in RFC 768 [RFC0768], in an IP version independent manner.

The current UDP-MIB defined in this memo consists of one table and a group of scalars:

- The udp group of scalars reports parameters and statistics of a UDP protocol engine. Two scalars, udpHCInDatagrams and udpHCOutDatagrams, have been added to this group since the publication of RFC 2013 [RFC2013] in order to provide high-capacity counters for fast networks. Discontinuities in the values of the counters in this group are indicated by discontinuities in the value of the sysUpTime object, which is defined in RFC 3418 [RFC3418].

- The udpEndpointTable provides access to status information for all UDP endpoints handled by a UDP protocol engine. The table provides for strictly listening endpoints, as with the historical udpTable, and also for "connected" UDP endpoints, which only accept packets from a given remote system. It also reports identification of the operating system level processes that handle UDP connections. Addresses and ports of UDP endpoints in this table are represented using the InetAddressType, InetAddress, and InetPortNumber textual conventions defined in RFC 4001 [RFC4001].

2.1. Relationship to Other MIBs

This section discusses the relationship of this UDP-MIB module to other MIB modules.

2.1.1. Relationship to RFC1213-MIB

UDP related MIB objects were originally defined as part of the RFC1213-MIB, defined in RFC 1213 [RFC1213]. The UDP related objects of the RFC1213-MIB were later copied into a separate MIB module and published in RFC 2013 [RFC2013] in SMIv2 format.

The previous versions of the UDP-MIB both defined the udpTable, which has been deprecated for basically two reasons:

(1) The udpTable only supports IPv4.

The current approach in the IETF is to write IP version neutral MIBs rather than have different definitions for various version of IP. This reduces the amount of overhead when new objects are introduced, since there is only one place to add them. Hence, the approach taken in RFC 2454 [RFC2454] of having separate tables is not continued.

(2) The udpTable does not permit describing "connected" UDP endpoints.

It turns out that "connected" endpoints tend to have a different behaviour and management access pattern from those of listening endpoints. Adding remote endpoint information to the udpEndpointTable thus allows for the addition of specific status and statistic objects for "connected" endpoints and connections.

2.1.2. Relationship to the IPV6-UDP-MIB

The IPV6-UDP-MIB, defined in RFC 2454 [RFC2454], has been moved to Historic because the approach of having separate IP version specific tables is not followed anymore. Implementation of RFC 2454 is thus not suggested anymore.

Note that because scoped addresses are now represented using the IPv4z and IPv6z address types, there is no longer a need to explicitly include the ifIndex in the index clause of the udpEndpointTable. This is a change from the use of ipv6UdpIfIndex in RFC 2454.

2.1.3. Relationship to HOST-RESOURCES-MIB and SYSAPPL-MIB

The udpEndpointTable reports the identification of the operating system level process that handles a connection or a listening endpoint. The value is reported as an Unsigned32, which is expected to be the same as the hrSWRunIndex of the HOST-RESOURCES-MIB [RFC2790] (if the value is smaller than 2147483647) or the sysApplElmtRunIndex of the SYSAPPL-MIB [RFC2287]. This allows management applications to identify the UDP connections that belong to an operating system level process, which has proven valuable in operational environments.

3. Definitions

```
UDP-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, Integer32, Counter32, Counter64,
    Unsigned32, IpAddress, mib-2       FROM SNMPv2-SMI
    MODULE-COMPLIANCE, OBJECT-GROUP    FROM SNMPv2-CONF
    InetAddress, InetAddressType,
    InetPortNumber                     FROM INET-ADDRESS-MIB;

udpMIB MODULE-IDENTITY
    LAST-UPDATED "200505200000Z"  -- May 20, 2005
    ORGANIZATION
           "IETF IPv6 Working Group
            http://www.ietf.org/html.charters/ipv6-charter.html"
    CONTACT-INFO
           "Bill Fenner (editor)

            AT&T Labs -- Research
            75 Willow Rd.
            Menlo Park, CA 94025

            Phone: +1 650 330-7893
            Email: <fenner@research.att.com>

            John Flick (editor)

            Hewlett-Packard Company
            8000 Foothills Blvd. M/S 5557
            Roseville, CA 95747

            Phone: +1 916 785 4018
            Email: <john.flick@hp.com>

            Send comments to <ipv6@ietf.org>"
```

```
        DESCRIPTION
                "The MIB module for managing UDP implementations.
                 Copyright (C) The Internet Society (2005).  This
                 version of this MIB module is part of RFC 4113;
                 see the RFC itself for full legal notices."
        REVISION      "200505200000Z"  -- May 20, 2005
        DESCRIPTION
                "IP version neutral revision, incorporating the
                 following revisions:

                 - Added udpHCInDatagrams and udpHCOutDatagrams in order
                   to provide high-capacity counters for fast networks.
                 - Added text to the descriptions of all counter objects
                   to indicate how discontinuities are detected.
                 - Deprecated the IPv4-specific udpTable and replaced it
                   with the version neutral udpEndpointTable.  This
                   table includes support for connected UDP endpoints
                   and support for identification of the operating
                   system process associated with a UDP endpoint.
                 - Deprecated the udpGroup and replaced it with object
                   groups representing the current set of objects.
                 - Deprecated udpMIBCompliance and replaced it with
                   udpMIBCompliance2, which includes the compliance
                   information for the new object groups.

                 This version published as RFC 4113."
        REVISION      "199411010000Z"    -- November 1, 1994
        DESCRIPTION
                "Initial SMIv2 version, published as RFC 2013."
        REVISION      "199103310000Z"    -- March 31, 1991
        DESCRIPTION
                "The initial revision of this MIB module was part of
                 MIB-II, published as RFC 1213."
        ::= { mib-2 50 }

    -- the UDP group

    udp      OBJECT IDENTIFIER ::= { mib-2 7 }

    udpInDatagrams OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
                "The total number of UDP datagrams delivered to UDP
                 users.
```

```
                Discontinuities in the value of this counter can occur
                at re-initialization of the management system, and at
                other times as indicated by discontinuities in the
                value of sysUpTime."
        ::= { udp 1 }

    udpNoPorts OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
               "The total number of received UDP datagrams for which
                there was no application at the destination port.

                Discontinuities in the value of this counter can occur
                at re-initialization of the management system, and at
                other times as indicated by discontinuities in the
                value of sysUpTime."
        ::= { udp 2 }

    udpInErrors OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
               "The number of received UDP datagrams that could not be
                delivered for reasons other than the lack of an
                application at the destination port.

                Discontinuities in the value of this counter can occur
                at re-initialization of the management system, and at
                other times as indicated by discontinuities in the
                value of sysUpTime."
        ::= { udp 3 }

    udpOutDatagrams OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
               "The total number of UDP datagrams sent from this
                entity.

                Discontinuities in the value of this counter can occur
                at re-initialization of the management system, and at
                other times as indicated by discontinuities in the
                value of sysUpTime."
        ::= { udp 4 }
```

```
   udpHCInDatagrams OBJECT-TYPE
       SYNTAX     Counter64
       MAX-ACCESS read-only
       STATUS     current
       DESCRIPTION
              "The total number of UDP datagrams delivered to UDP
               users, for devices that can receive more than 1
               million UDP datagrams per second.

               Discontinuities in the value of this counter can occur
               at re-initialization of the management system, and at
               other times as indicated by discontinuities in the
               value of sysUpTime."
       ::= { udp 8 }

   udpHCOutDatagrams OBJECT-TYPE
       SYNTAX     Counter64
       MAX-ACCESS read-only
       STATUS     current
       DESCRIPTION
              "The total number of UDP datagrams sent from this
               entity, for devices that can transmit more than 1
               million UDP datagrams per second.

               Discontinuities in the value of this counter can occur
               at re-initialization of the management system, and at
               other times as indicated by discontinuities in the
               value of sysUpTime."
       ::= { udp 9 }

   --
   -- { udp 6 } was defined as the ipv6UdpTable in RFC2454's
   -- IPV6-UDP-MIB.  This RFC obsoletes RFC 2454, so { udp 6 } is
   -- obsoleted.
   --

   -- The UDP "Endpoint" table.

   udpEndpointTable OBJECT-TYPE
       SYNTAX     SEQUENCE OF UdpEndpointEntry
       MAX-ACCESS not-accessible
       STATUS     current
       DESCRIPTION
              "A table containing information about this entity's UDP
               endpoints on which a local application is currently
               accepting or sending datagrams.
```

```
                The address type in this table represents the address
                type used for the communication, irrespective of the
                higher-layer abstraction.  For example, an application
                using IPv6 'sockets' to communicate via IPv4 between
                ::ffff:10.0.0.1 and ::ffff:10.0.0.2 would use
                InetAddressType ipv4(1).

                Unlike the udpTable in RFC 2013, this table also allows
                the representation of an application that completely
                specifies both local and remote addresses and ports.  A
                listening application is represented in three possible
                ways:

                1) An application that is willing to accept both IPv4
                   and IPv6 datagrams is represented by a
                   udpEndpointLocalAddressType of unknown(0) and a
                   udpEndpointLocalAddress of ''h (a zero-length
                   octet-string).

                2) An application that is willing to accept only IPv4
                   or only IPv6 datagrams is represented by a
                   udpEndpointLocalAddressType of the appropriate
                   address type and a udpEndpointLocalAddress of
                   '0.0.0.0' or '::' respectively.

                3) An application that is listening for datagrams only
                   for a specific IP address but from any remote
                   system is represented by a
                   udpEndpointLocalAddressType of the appropriate
                   address type, with udpEndpointLocalAddress
                   specifying the local address.

                In all cases where the remote is a wildcard, the
                udpEndpointRemoteAddressType is unknown(0), the
                udpEndpointRemoteAddress is ''h (a zero-length
                octet-string), and the udpEndpointRemotePort is 0.

                If the operating system is demultiplexing UDP packets
                by remote address and port, or if the application has
                'connected' the socket specifying a default remote
                address and port, the udpEndpointRemote* values should
                be used to reflect this."
        ::= { udp 7 }

    udpEndpointEntry OBJECT-TYPE
        SYNTAX     UdpEndpointEntry
        MAX-ACCESS not-accessible
        STATUS     current
```

```
       DESCRIPTION
              "Information about a particular current UDP endpoint.

               Implementers need to be aware that if the total number
               of elements (octets or sub-identifiers) in
               udpEndpointLocalAddress and udpEndpointRemoteAddress
               exceeds 111, then OIDs of column instances in this table
               will have more than 128 sub-identifiers and cannot be
               accessed using SNMPv1, SNMPv2c, or SNMPv3."
       INDEX   { udpEndpointLocalAddressType,
                 udpEndpointLocalAddress,
                 udpEndpointLocalPort,
                 udpEndpointRemoteAddressType,
                 udpEndpointRemoteAddress,
                 udpEndpointRemotePort,
                 udpEndpointInstance }
       ::= { udpEndpointTable 1 }

   UdpEndpointEntry ::= SEQUENCE {
           udpEndpointLocalAddressType   InetAddressType,
           udpEndpointLocalAddress       InetAddress,
           udpEndpointLocalPort          InetPortNumber,
           udpEndpointRemoteAddressType  InetAddressType,
           udpEndpointRemoteAddress      InetAddress,
           udpEndpointRemotePort         InetPortNumber,
           udpEndpointInstance           Unsigned32,
           udpEndpointProcess            Unsigned32
       }

   udpEndpointLocalAddressType OBJECT-TYPE
       SYNTAX     InetAddressType
       MAX-ACCESS not-accessible
       STATUS     current
       DESCRIPTION
              "The address type of udpEndpointLocalAddress.  Only
               IPv4, IPv4z, IPv6, and IPv6z addresses are expected, or
               unknown(0) if datagrams for all local IP addresses are
               accepted."
       ::= { udpEndpointEntry 1 }

   udpEndpointLocalAddress OBJECT-TYPE
       SYNTAX     InetAddress
       MAX-ACCESS not-accessible
       STATUS     current
       DESCRIPTION
              "The local IP address for this UDP endpoint.

               The value of this object can be represented in three
```

```
                possible ways, depending on the characteristics of the
                listening application:

                1. For an application that is willing to accept both
                   IPv4 and IPv6 datagrams, the value of this object
                   must be ''h (a zero-length octet-string), with
                   the value of the corresponding instance of the
                   udpEndpointLocalAddressType object being unknown(0).

                2. For an application that is willing to accept only IPv4
                   or only IPv6 datagrams, the value of this object
                   must be '0.0.0.0' or '::', respectively, while the
                   corresponding instance of the
                   udpEndpointLocalAddressType object represents the
                   appropriate address type.

                3. For an application that is listening for data
                   destined only to a specific IP address, the value
                   of this object is the specific IP address for which
                   this node is receiving packets, with the
                   corresponding instance of the
                   udpEndpointLocalAddressType object representing the
                   appropriate address type.

                As this object is used in the index for the
                udpEndpointTable, implementors of this table should be
                careful not to create entries that would result in OIDs
                with more than 128 subidentifiers; else the information
                cannot be accessed using SNMPv1, SNMPv2c, or SNMPv3."
        ::= { udpEndpointEntry 2 }

    udpEndpointLocalPort OBJECT-TYPE
        SYNTAX     InetPortNumber
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
                "The local port number for this UDP endpoint."
        ::= { udpEndpointEntry 3 }

    udpEndpointRemoteAddressType OBJECT-TYPE
        SYNTAX     InetAddressType
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
                "The address type of udpEndpointRemoteAddress.  Only
                 IPv4, IPv4z, IPv6, and IPv6z addresses are expected, or
                 unknown(0) if datagrams for all remote IP addresses are
                 accepted.  Also, note that some combinations of
```

```
                udpEndpointLocalAdressType and
                udpEndpointRemoteAddressType are not supported.  In
                particular, if the value of this object is not
                unknown(0), it is expected to always refer to the
                same IP version as udpEndpointLocalAddressType."
        ::= { udpEndpointEntry 4 }

    udpEndpointRemoteAddress OBJECT-TYPE
        SYNTAX     InetAddress
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
               "The remote IP address for this UDP endpoint.  If
                datagrams from any remote system are to be accepted,
                this value is ''h (a zero-length octet-string).
                Otherwise, it has the type described by
                udpEndpointRemoteAddressType and is the address of the
                remote system from which datagrams are to be accepted
                (or to which all datagrams will be sent).

                As this object is used in the index for the
                udpEndpointTable, implementors of this table should be
                careful not to create entries that would result in OIDs
                with more than 128 subidentifiers; else the information
                cannot be accessed using SNMPv1, SNMPv2c, or SNMPv3."
        ::= { udpEndpointEntry 5 }

    udpEndpointRemotePort OBJECT-TYPE
        SYNTAX     InetPortNumber
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
               "The remote port number for this UDP endpoint.  If
                datagrams from any remote system are to be accepted,
                this value is zero."
        ::= { udpEndpointEntry 6 }

    udpEndpointInstance OBJECT-TYPE
        SYNTAX     Unsigned32 (1..'ffffffff'h)
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
               "The instance of this tuple.  This object is used to
                distinguish among multiple processes 'connected' to
                the same UDP endpoint.  For example, on a system
                implementing the BSD sockets interface, this would be
                used to support the SO_REUSEADDR and SO_REUSEPORT
                socket options."
```

```
        ::= { udpEndpointEntry 7 }

    udpEndpointProcess OBJECT-TYPE
        SYNTAX     Unsigned32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
               "The system's process ID for the process associated with
                this endpoint, or zero if there is no such process.
                This value is expected to be the same as
                HOST-RESOURCES-MIB::hrSWRunIndex or SYSAPPL-MIB::
                sysApplElmtRunIndex for some row in the appropriate
                tables."
        ::= { udpEndpointEntry 8 }

    -- The deprecated UDP Listener table

    -- The deprecated UDP listener table only contains information
    -- about this entity's IPv4 UDP end-points on which a local
    -- application is currently accepting datagrams.  It does not
    -- provide more detailed connection information, or information
    -- about IPv6 endpoints.

    udpTable OBJECT-TYPE
        SYNTAX     SEQUENCE OF UdpEntry
        MAX-ACCESS not-accessible
        STATUS     deprecated
        DESCRIPTION
               "A table containing IPv4-specific UDP listener
                information.  It contains information about all local
                IPv4 UDP end-points on which an application is
                currently accepting datagrams.  This table has been
                deprecated in favor of the version neutral
                udpEndpointTable."
        ::= { udp 5 }

    udpEntry OBJECT-TYPE
        SYNTAX     UdpEntry
        MAX-ACCESS not-accessible
        STATUS     deprecated
        DESCRIPTION
               "Information about a particular current UDP listener."
        INDEX   { udpLocalAddress, udpLocalPort }
        ::= { udpTable 1 }

    UdpEntry ::= SEQUENCE {
        udpLocalAddress   IpAddress,
        udpLocalPort      Integer32
```

```
   }

   udpLocalAddress OBJECT-TYPE
       SYNTAX     IpAddress
       MAX-ACCESS read-only
       STATUS     deprecated
       DESCRIPTION
              "The local IP address for this UDP listener.  In the
               case of a UDP listener that is willing to accept
               datagrams for any IP interface associated with the
               node, the value 0.0.0.0 is used."
       ::= { udpEntry 1 }

   udpLocalPort OBJECT-TYPE
       SYNTAX     Integer32 (0..65535)
       MAX-ACCESS read-only
       STATUS     deprecated
       DESCRIPTION
              "The local port number for this UDP listener."
       ::= { udpEntry 2 }

   -- conformance information

   udpMIBConformance OBJECT IDENTIFIER ::= { udpMIB 2 }
   udpMIBCompliances OBJECT IDENTIFIER ::= { udpMIBConformance 1 }
   udpMIBGroups      OBJECT IDENTIFIER ::= { udpMIBConformance 2 }

   -- compliance statements

   udpMIBCompliance2 MODULE-COMPLIANCE
       STATUS     current
       DESCRIPTION
              "The compliance statement for systems that implement
               UDP.

               There are a number of INDEX objects that cannot be
               represented in the form of OBJECT clauses in SMIv2, but
               for which we have the following compliance
               requirements, expressed in OBJECT clause form in this
               description clause:

               -- OBJECT      udpEndpointLocalAddressType
               -- SYNTAX      InetAddressType { unknown(0), ipv4(1),
               --                               ipv6(2), ipv4z(3),
               --                               ipv6z(4) }
               -- DESCRIPTION
               --     Support for dns(5) is not required.
               -- OBJECT      udpEndpointLocalAddress
```

```
               -- SYNTAX      InetAddress (SIZE(0|4|8|16|20))
               -- DESCRIPTION
               --     Support is only required for zero-length
               --     octet-strings, and for scoped and unscoped
               --     IPv4 and IPv6 addresses.
               -- OBJECT      udpEndpointRemoteAddressType
               -- SYNTAX      InetAddressType { unknown(0), ipv4(1),
               --                               ipv6(2), ipv4z(3),
               --                               ipv6z(4) }
               -- DESCRIPTION
               --     Support for dns(5) is not required.
               -- OBJECT      udpEndpointRemoteAddress
               -- SYNTAX      InetAddress (SIZE(0|4|8|16|20))
               -- DESCRIPTION
               --     Support is only required for zero-length
               --     octet-strings, and for scoped and unscoped
               --     IPv4 and IPv6 addresses.
             "
        MODULE  -- this module
             MANDATORY-GROUPS { udpBaseGroup, udpEndpointGroup }
             GROUP       udpHCGroup
             DESCRIPTION
                    "This group is mandatory for systems that
                     are capable of receiving or transmitting more than
                     1 million UDP datagrams per second.  1 million
                     datagrams per second will cause a Counter32 to
                     wrap in just over an hour."
        ::= { udpMIBCompliances 2 }

    udpMIBCompliance MODULE-COMPLIANCE
        STATUS     deprecated
        DESCRIPTION
               "The compliance statement for IPv4-only systems that
                implement UDP.  For IP version independence, this
                compliance statement is deprecated in favor of
                udpMIBCompliance2.  However, agents are still
                encouraged to implement these objects in order to
                interoperate with the deployed base of managers."
        MODULE  -- this module
            MANDATORY-GROUPS { udpGroup }
        ::= { udpMIBCompliances 1 }

    -- units of conformance

    udpGroup OBJECT-GROUP
        OBJECTS   { udpInDatagrams, udpNoPorts,
                    udpInErrors, udpOutDatagrams,
                    udpLocalAddress, udpLocalPort }
```

```
        STATUS     deprecated
        DESCRIPTION
               "The deprecated group of objects providing for
                management of UDP over IPv4."
        ::= { udpMIBGroups 1 }

    udpBaseGroup OBJECT-GROUP
        OBJECTS   { udpInDatagrams, udpNoPorts, udpInErrors,
                    udpOutDatagrams }
        STATUS     current
        DESCRIPTION
               "The group of objects providing for counters of UDP
                statistics."
        ::= { udpMIBGroups 2 }

    udpHCGroup OBJECT-GROUP
        OBJECTS   { udpHCInDatagrams, udpHCOutDatagrams }
        STATUS     current
        DESCRIPTION
               "The group of objects providing for counters of high
                speed UDP implementations."
        ::= { udpMIBGroups 3 }

    udpEndpointGroup OBJECT-GROUP
        OBJECTS    { udpEndpointProcess }
        STATUS     current
        DESCRIPTION
               "The group of objects providing for the IP version
                independent management of UDP 'endpoints'."
        ::= { udpMIBGroups 4 }

    END
```

4. Acknowledgements

This document contains a modified subset of RFC 1213 and replaces RFCs 2013 and 2454. Acknowledgments are therefore due to the authors and editors of these documents for their excellent work.

5. Contributors

This document is an output of the IPv6 MIB revision team, and contributors to earlier versions of this document include:

Bill Fenner, AT&T Labs -- Research
Email: fenner@research.at.com

Brian Haberman
Email: brian@innovationslab.net

Shawn A. Routhier, Wind River
Email: sar@epilogue.com

Juergen Schoenwalder, TU Braunschweig
Email: schoenw@ibr.cs.tu-bs.de

Dave Thaler, Microsoft
Email: dthaler@windows.microsoft.com

Much of Keith McCloghrie's text from RFC1213/RFC2013 remains in this document, and the structure of the MIB is due to him.

Mike Daniele wrote the original IPv6 UDP MIB in RFC2454.

Juergen Schoenwalder provided much of the text for section 2.

6. Security Considerations

There are no management objects defined in this MIB that have a MAX-ACCESS clause of read-write and/or read-create. So, if this MIB is implemented correctly, then there is no risk that an intruder can alter or create any management objects of this MIB module via direct SNMP SET operations.

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control even GET and/or NOTIFY access to these objects and possibly to even encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability:

The indices of the udpEndpointTable and udpTable contain information on the listeners on an entity. In particular, the udpEndpointLocalPort and udpLocalPort objects in the indices can be used to identify what ports are open on the machine and what attacks are likely to succeed, without the attacker having to run a port scanner.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPSec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB module.

It is recommended that the implementors consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Furthermore, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

7. IANA Considerations

The MIB module in this document uses the following IANA-assigned OBJECT IDENTIFIER values, recorded in the SMI Numbers registry:

Descriptor	OBJECT IDENTIFIER value
udp	{ mib-2 7}
udpMIB	{ mib-2 50 }

8. References

8.1. Normative References

[RFC0768] Postel, J., "User Datagram Protocol", STD 6, RFC 768, August 1980.

[RFC2578] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.

[RFC2579] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.

[RFC2580] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Conformance Statements for SMIv2", STD 58, RFC 2580, April 1999.

[RFC3418] Presuhn, R., "Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)", STD 62, RFC 3418, December 2002.

[RFC4001] Daniele, M., Haberman, B., Routhier, S., and J. Schoenwaelder, "Textual Conventions for Internet Network Addresses", RFC 4001, February 2005.

8.2. Informative References

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Authors' Addresses

Bill Fenner
AT&T Labs -- Research
75 Willow Rd
Menlo Park, CA 94025
USA

EMail: fenner@research.att.com

John Flick
Hewlett-Packard Company
8000 Foothills Blvd. M/S 5557
Roseville, CA 95747-5557
USA

EMail: john.flick@hp.com

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