MIB for the UDP-Lite Protocol

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 specifies a Management Information Base (MIB) module for the Lightweight User Datagram Protocol (UDP-Lite). It defines a set of new MIB objects to characterise the behaviour and performance of transport layer endpoints deploying UDP-Lite. UDP-Lite resembles UDP, but differs from the semantics of UDP by the addition of a single option. This adds the capability for variable-length data checksum coverage, which can benefit a class of applications that prefer delivery of (partially) corrupted datagram payload data in preference to discarding the datagram.

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1. Introduction

The Lightweight User Datagram Protocol (UDP-Lite) [RFC3828] (also known as UDPLite) is an IETF standards-track transport protocol. The operation of UDP-Lite is similar to the User Datagram Protocol (UDP) [RFC768], but can also serve applications in error-prone network environments that prefer to have partially damaged payloads delivered rather than discarded. This is achieved by changing the semantics of the UDP Length field to that of a Checksum Coverage field. If this feature is not used, UDP-Lite is semantically identical to UDP.

The interface of UDP-Lite differs from that of UDP by the addition of a single option, which communicates a length value. At the sender this specifies the intended datagram checksum coverage; at the receiver it signifies a minimum coverage threshold for incoming datagrams. This length value may also be modified during the lifetime of a connection. UDP-Lite does not provide mechanisms to negotiate the checksum coverage between the sender and receiver. Where required, this needs to be communicated by another protocol. The Datagram Congestion Control Protocol (DCCP) [RFC4340] for instance includes a capability to negotiate checksum coverage values.

This document defines a set of runtime statistics (variables) that facilitate network management/monitoring as well as unified comparisons between different protocol implementations and operating environments. To provide a common interface for users and implementors of UDP-Lite modules, the definitions of these runtime statistics are provided as a MIB module using the SMIv2 format [RFC2578].

1.1. Relationship to the UDP-MIB

The similarities between UDP and UDP-Lite suggest that the MIB module for UDP-Lite should resemble that of UDP [RFC4113], with extensions corresponding to the additional capabilities of UDP-Lite. The UDP-Lite MIB module is placed beneath the mib-2 subtree, adhering to the familiar structure of the UDP-MIB module to ease integration.

In particular, these well-known basic counters are supported:

- InDatagrams
- NoPorts
- InErrors
- OutDatagrams
The following read-only variables have been added to the basic structure used in the UDP-MIB module:

- **InPartialCov**: The number of received datagrams, with a valid format and checksum, whose checksum coverage is strictly less than the datagram length.

- **InBadChecksum**: The number of received datagrams with an invalid checksum (i.e., where the receiver-recalculated UDP-Lite checksum does not match that in the Checksum field). Unlike NoPorts, this error type also counts as InErrors.

- **OutPartialCov**: The number of sent datagrams with a valid format and checksum whose checksum coverage is strictly less than the datagram length.

All non-error counters used in this document are 64-bit counters. This is a departure from UDP, which traditionally used 32-bit counters and mandates 64-bit counters only on fast networks [RFC4113]. This choice is justified by the fact that UDP-Lite is a more recent protocol, and that network speeds continue to grow.

Another difference from the UDP MIB module is that the UDP-Lite MIB module does not support an IPv4-only listener table. This feature was present only for compatibility reasons and is superseded by the more informative endpoint table. Two columnar objects have been added to this table:

- **udpliteEndpointMinCoverage**: The minimum acceptable receiver checksum coverage length [RFC3828]. This value may be manipulated by the application attached to the receiving endpoint.

- **udpliteEndpointViolCoverage**: This object is optional and counts the number of valid datagrams with a checksum coverage value less than the corresponding value of udpliteEndpointMinCoverage. Although being otherwise valid, such datagrams are discarded rather than passed to the application. This object thus serves to separate cases of violated coverage from other InErrors.

The second entry is not required to manage the transport protocol and hence is not mandatory. It may be implemented to assist in debugging application design and configuration.

The UDP-Lite MIB module also provides a discontinuity object to help determine whether one or more of its counters experienced a discontinuity event. This is an event, other than re-initialising the management system, that invalidates the management entity’s understanding of the counter values.
For example, if UDP-Lite is implemented as a loadable operating
system module, a module load or unload would produce a discontinuity. By querying the value of udpliteStatsDiscontinuityTime, a management entity can determine whether or not a discontinuity event has occurred.

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

The UDP-Lite endpoint table contains one columnar object, udpliteEndpointProcess, reporting a unique value that identifies a distinct piece of software associated with this endpoint. (When more than one piece of software is associated with this endpoint, a representative is chosen, so that consecutive queries consistently refer to the same identifier. The reported value is then consistent, as long as the representative piece of software is running and still associated with the endpoint.)

The value of udpliteEndpointProcess is reported as an Unsigned32, and it shares with the hrSWRunIndex of the HOST-RESOURCES-MIB [RFC2790] and the sysApplElmtRunIndex of the SYSAPPL-MIB [RFC2287] the requirement that, wherever possible, this should be the native and unique identification number employed by the system.

If the SYSAPPL-MIB module is available, the value of udpliteEndpointProcess should correspond to the appropriate value of sysApplElmtRunIndex. If not available, an alternative should be used (e.g., the hrSWRunIndex of the HOST-RESOURCES-MIB module).
1.3. Interpretation of the MIB Variables

Figure 1 shows an informal survey of the packet processing path, with reference to counter names in parentheses.

Received UDP-Lite Datagrams

```
| +---- Full Coverage ------------------------|-> Deliver |
| +---- Valid Header-----+                +---- >= Rec. Coverage ---> |
| (InDatagrams)         |                |
| +---- Partial -------+                +---- < Rec. Coverage ---> |
| (InPartialCov)        |                |
|                        +---- Header Error ----+ |
|                        +---- Checksum Error +------------------> Discard |
|                        (InBadChecksum)                    | (InErrors) |
|                        +---- Port Error --------------------------|-> Discard |
|                        (NoPorts)                           |

Figure 1: UDP-Lite Input Processing Path
```

A platform-independent test of the UDP-Lite implementations in two connected end hosts may be performed as follows.

On the sending side, OutDatagrams and OutPartialCov are observed. The ratio OutPartialCov/OutDatagrams describes the fraction (between 0 and 1) of datagrams using partial checksum coverage.

On the receiving side, InDatagrams, InPartialCov, and InErrors are monitored. If datagrams are received from the given sender, InErrors is close to zero, and InPartialCov is zero, no partial coverage is employed. If no datagrams are received and InErrors increases proportionally with the sending rate, a configuration error is likely (a wrong value of receiver minimum checksum coverage).

The InBadChecksum counter reflects errors that may persist following end-host processing, router processing, or link processing (this includes illegal coverage values as defined in [RFC3828], since checksum and checksum coverage are mutually interdependent). In particular, InBadChecksum can serve as an indicator of the residual
link bit error rate: on links with higher bit error rates, a lower value of the checksum coverage may help to reduce the values of both InErrors and InBadChecksum. By observing these values and adapting the configuration, a setting may then be found that is more adapted to the specific type of link, and the type of payload. In particular, a reduction in the number of discarded datagrams (InErrors), may indicate an improved performance.

The above statistics are elementary and can be used to derive the following information:

- The total number of incoming datagrams is InDatagrams + InErrors + NoPorts.
- The number of InErrors that were discarded due to problems other than a bad checksum is InErrors - InBadChecksum.
- The number of InDatagrams that have full coverage is InDatagrams - InPartialCov.
- The number of OutDatagrams that have full coverage is OutDatagrams - OutPartialCov.
The following Case diagram [CASE] summarises the relationships between the counters on the input processing path.

Transport Layer Interface
-------------------------------------------------------------
\/
||
----------------------------- InDatagrams
||                             ^
||                             |
||                             |
||                             |
||----------------------> InPartialCov
||                             v
||                             |
||                             |
||                             |
||                             v
||                             EndpointViolCoverage
||------> InBadChecksum ------>|
||                             |
||                             |
||                             |
||                             v
||------------------------> InErrors
||                             |
||                             |
||                             |
||                             v
||-----------------------------
||                             |
| Network Layer Interface
Figure 2: Counters for Received UDP-Lite Datagrams

A configuration error may occur when a sender chooses a coverage value for the datagrams that it sends that is less than the minimum coverage configured by the intended recipient. The minimum coverage is set on a per-session basis by the application associated with the listening endpoint, and its current value is recorded in the udpliteEndpointTable. Reception of valid datagrams with a checksum coverage value less than this threshold results in dropping the datagram [RFC3828] and incrementing InErrors. To improve debugging of such (misconfigured) cases, an implementer may choose to support the optional udpliteEndpointViolCoverage entry in the endpoint table (Section 1.1) that specifically counts datagrams falling in this category. Without this feature, failure due to misconfiguration can not be distinguished from datagram processing failure.
1.4. Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119].

2. 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].

3. Definitions

UDPLITE-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE,
    mib-2, Unsigned32, Counter32, Counter64 FROM SNMPv2-SMI           -- [RFC2578]
    TimeStamp              FROM SNMPv2-TC            -- [RFC2579]

    MODULE-COMPLIANCE,
    OBJECT-GROUP           FROM SNMPv2-CONF          -- [RFC2580]

    InetAddress, InetAddressType, InetPortNumber FROM INET-ADDRESS-MIB;    -- [RFC4001]

udpliteMIB MODULE-IDENTITY
    LAST-UPDATED "200712180000Z"       -- 18 December 2007
    ORGANIZATION "IETF TSV Working Group (TSVWG)"
    CONTACT-INFO
        "IETF TSV Working Group
Mailing List: tsvwg@ietf.org
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DESCRIPTION
"The MIB module for managing UDP-Lite implementations.
Copyright (C) The IETF Trust (2008). This version of
this MIB module is part of RFC 5097; see the RFC
itself for full legal notices."

REVISION "200712180000Z" -- 18 December 2007
DESCRIPTION
"Initial SMIv2 revision, based on the format of the UDP
MIB module (RFC 4113) and published as RFC 5097."

::= { mib-2 170 }

udplite OBJECT IDENTIFIER ::= { udpliteMIB 1 }

udpliteInDatagrams OBJECT-TYPE -- as in UDP-MIB
SYNTAX Counter64
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The total number of UDP-Lite datagrams that were
delivered to UDP-Lite users.
Discontinuities in the value of this counter can occur
at re-initialisation of the management system, and at
other times as indicated by the value of
udpliteStatsDiscontinuityTime."

::= { udplite 1 }

udpliteInPartialCov OBJECT-TYPE -- new in UDP-Lite
SYNTAX Counter64
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The total number of UDP-Lite datagrams that were
delivered to UDP-Lite users (applications) and whose
checksum coverage was strictly less than the datagram
length.
Discontinuities in the value of this counter can occur
at re-initialisation of the management system, and at
other times as indicated by the value of
udpliteStatsDiscontinuityTime."

::= { udplite 2 }
udpliteNoPorts OBJECT-TYPE  -- as in UDP-MIB
SYNTAX     Counter32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The total number of received UDP-Lite datagrams for which there was no listener at the destination port. Discontinuities in the value of this counter can occur at re-initialisation of the management system, and at other times as indicated by the value of udpliteStatsDiscontinuityTime."
 ::= { udplite 3 }

udpliteInErrors OBJECT-TYPE  -- as in UDP-MIB
SYNTAX     Counter32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The number of received UDP-Lite 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-initialisation of the management system, and at other times as indicated by the value of udpliteStatsDiscontinuityTime."
 ::= { udplite 4 }

udpliteInBadChecksum OBJECT-TYPE  -- new in UDP-Lite
SYNTAX     Counter32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The number of received UDP-Lite datagrams whose checksum could not be validated. This includes illegal checksum coverage values, as their use would lead to incorrect checksums. Discontinuities in the value of this counter can occur at re-initialisation of the management system, and at other times as indicated by the value of udpliteStatsDiscontinuityTime."
REFERENCE "RFC 3828, section 3.1"
 ::= { udplite 5 }

udpliteOutDatagrams OBJECT-TYPE  -- as in UDP-MIB
SYNTAX     Counter64
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
"The total number of UDP-Lite datagrams sent from this entity. Discontinuities in the value of this counter can occur at re-initialisation of the management system, and at other times as indicated by the value of udpliteStatsDiscontinuityTime."

::= { udplite 6 }

udpliteOutPartialCov OBJECT-TYPE -- new in UDP-Lite
SYNTAX Counter64
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The total number of udpliteOutDatagrams whose checksum coverage was strictly less than the datagram length. Discontinuities in the value of this counter can occur at re-initialisation of the management system, and at other times as indicated by the value of udpliteStatsDiscontinuityTime."

::= { udplite 7 }

udpliteEndpointTable OBJECT-TYPE
SYNTAX SEQUENCE OF UdpLiteEndpointEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"A table containing information about this entity’s UDP-Lite 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).

Like the udpTable in RFC 4113, 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 udpliteEndpointLocalAddressType of unknown(0) and a udpliteEndpointLocalAddress 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 udpliteEndpointLocalAddressType of the appropriate address type and a udpliteEndpointLocalAddress 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 udpliteEndpointLocalAddressType of the appropriate address type, with udpliteEndpointLocalAddress specifying the local address.

In all cases where the remote address is a wildcard, the udpliteEndpointRemoteAddressType is unknown(0), the udpliteEndpointRemoteAddress is ’h (a zero-length octet-string), and the udpliteEndpointRemotePort is 0.

If the operating system is demultiplexing UDP-Lite packets by remote address/port, or if the application has ‘connected’ the socket specifying a default remote address/port, the udpliteEndpointRemote* values should be used to reflect this."

\[\text{udpliteEndpointEntry OBJECT-TYPE}\]
\[\text{SYNTAX} \quad \text{UdpLiteEndpointEntry}\]
\[\text{MAX-ACCESS} \quad \text{not-accessible}\]
\[\text{STATUS} \quad \text{current}\]
\[\text{DESCRIPTION}\]
"Information about a particular current UDP-Lite endpoint. Implementers need to pay attention to the sizes of udpliteEndpointLocalAddress/RemoteAddress, as Object Identifiers (OIDs) of column instances in this table must have no more than 128 sub-identifiers in order to remain accessible with SNMPv1, SNMPv2c, and SNMPv3."

\[\text{INDEX}\]
\{ udpliteEndpointLocalAddressType, udpliteEndpointLocalAddress, udpliteEndpointLocalPort, udpliteEndpointRemoteAddressType, udpliteEndpointRemoteAddress, udpliteEndpointRemotePort, udpliteEndpointInstance \}

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

udpliteEndpointLocalAddress OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The local IP address for this UDP-Lite 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 EndpointLocalAddressType 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 EndpointLocalAddressType 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
EndpointLocalAddressType object representing the
appropriate address type.

As this object is used in the index for the
udpliteEndpointTable, implementors should be careful
not to create entries that would result in OIDs with
more than 128 sub-identifiers; this is because of SNMP
and SMI limitations."

::= { udpliteEndpointEntry 2 }

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

udpliteEndpointRemoteAddressType OBJECT-TYPE
SYNTAX     InetAddressType
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"The address type of udpliteEndpointRemoteAddress. 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
udpliteEndpointLocalAdressType and
udpliteEndpointRemoteAddressType 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 udpliteEndpointLocalAddressType."
::= { udpliteEndpointEntry 4 }

udpliteEndpointRemoteAddress OBJECT-TYPE
SYNTAX     InetAddress
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"The remote IP address for this UDP-Lite 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
udpliteEndpointRemoteAddressType 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 udpliteEndpointTable, implementors should be careful not to create entries that would result in OIDs with more than 128 sub-identifiers; this is because of SNMP and SMI limitations.

```plaintext
::= { udpliteEndpointEntry 5 }
```

**udpliteEndpointRemotePort**

OBJECT-TYPE

SYNTAX InetPortNumber

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The remote port number for this UDP-Lite endpoint. If datagrams from any remote system are to be accepted, this value is zero."

```plaintext
::= { udpliteEndpointEntry 6 }
```

**udpliteEndpointInstance**

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-Lite 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."

```plaintext
::= { udpliteEndpointEntry 7 }
```

**udpliteEndpointProcess**

OBJECT-TYPE

SYNTAX Unsigned32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A unique value corresponding to a piece of software running on this endpoint.

If this endpoint is associated with more than one piece of software, the agent should choose one of these. As long as the representative piece of software is running and still associated with the endpoint, subsequent reads will consistently return the same value. The implementation may use any algorithm satisfying these constraints (e.g., choosing the entity..."
with the oldest start time).

This identifier is platform-specific. Wherever possible, it should use the system’s native, unique identification number as the value.

If the SYSAPPL-MIB module is available, the value should be the same as sysApplElmtRunIndex. If not available, an alternative should be used (e.g., the hrSWRunIndex of the HOST-RESOURCES-MIB module).

If it is not possible to uniquely identify the pieces of software associated with this endpoint, then the value zero should be used. (Note that zero is otherwise a valid value for sysApplElmtRunIndex.)

::= { udpliteEndpointEntry 8 }

udpliteEndpointMinCoverage OBJECT-TYPE -- new in UDP-Lite
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The minimum checksum coverage expected by this endpoint. A value of 0 indicates that only fully covered datagrams are accepted."
REFERENCE "RFC 3828, section 3.1"
::= { udpliteEndpointEntry 9 }

udpliteEndpointViolCoverage OBJECT-TYPE -- new / optional in UDP-Lite
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of datagrams received by this endpoint whose checksum coverage violated the minimum coverage threshold set for this connection (i.e., all valid datagrams whose checksum coverage was strictly smaller than the minimum, as defined in RFC 3828). Discontinuities in the value of this counter can occur at re-initialisation of the management system, and at other times as indicated by the value of udpliteStatsDiscontinuityTime."
::= { udpliteEndpointEntry 10 }
udpliteStatsDiscontinuityTime OBJECT-TYPE
SYNTAX    TimeStamp
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
"The value of sysUpTime at the most recent occasion at
which one or more of the UDP-Lite counters suffered a
discontinuity.
A value of zero indicates no such discontinuity has
occurred since the last re-initialisation of the local
management subsystem."
::= { udplite 9 }

-- Conformance Information
udpliteMIBConformance OBJECT IDENTIFIER ::= { udpliteMIB 2 }

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

  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      udpliteEndpointLocalAddressType
  -- SYNTAX      InetAddressType { unknown(0), ipv4(1),
  -- ipv6(2), ipv4z(3),
  -- ipv6z(4) }
  -- DESCRIPTION
  -- Support for dns(16) is not required.
  -- OBJECT      udpliteEndpointLocalAddress
  -- 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      udpliteEndpointRemoteAddressType
  -- SYNTAX      InetAddressType { unknown(0), ipv4(1),
  -- ipv6(2), ipv4z(3),
  -- ipv6z(4) }
  -- DESCRIPTION
  -- Support for dns(16) is not required.
  -- OBJECT      udpliteEndpointRemoteAddress
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January 2008

-- 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 { udpliteBaseGroup,
    udplitePartialCsumGroup,
    udpliteEndpointGroup    } =
GROUP               udpliteAppGroup
DESCRIPTION
"This group is optional and provides supplementary
information about the effectiveness of using minimum
checksum coverage thresholds on endpoints."
::= { udpliteMIBConformance 1 }

udpliteMIBGroups OBJECT IDENTIFIER ::= { udpliteMIBConformance 2 }

udpliteBaseGroup OBJECT-GROUP -- as in UDP
OBJECTS   { udpliteInDatagrams, udpliteNoPorts, udpliteInErrors,
             udpliteOutDatagrams, udpliteStatsDiscontinuityTime }
STATUS     current
DESCRIPTION
"The group of objects providing for counters of
basic UDP-like statistics."
::= { udpliteMIBGroups 1 }

udplitePartialCsumGroup OBJECT-GROUP -- specific to UDP-Lite
OBJECTS   { udpliteInPartialCov,
             udpliteInBadChecksum,
             udpliteOutPartialCov }
STATUS     current
DESCRIPTION
"The group of objects providing for counters of
transport layer statistics exclusive to UDP-Lite."
::= { udpliteMIBGroups 2 }

udpliteEndpointGroup OBJECT-GROUP
OBJECTS   { udpliteEndpointProcess, udpliteEndpointMinCoverage }
STATUS     current
DESCRIPTION
"The group of objects providing for the IP version
independent management of UDP-Lite ‘endpoints’."
::= { udpliteMIBGroups 3 }

Renker & Fairhurst          Standards Track                    [Page 18]
udpliteAppGroup OBJECT-GROUP
  OBJECTS { udpliteEndpointViolCoverage }
  STATUS current
  DESCRIPTION
      "The group of objects that provide application-level
       information for the configuration management of
       UDP-Lite ‘endpoints’.
      ::= { udpliteMIBGroups 4 }

END

4. Security Considerations

There are no management objects defined in this MIB module that have
a MAX-ACCESS clause of read-write and/or read-create. So, if this
MIB module 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 udpliteEndpointTable contain information about the
listeners on an entity. In particular, the udpliteEndpointLocalPort
index objects can be used to identify ports that are open on the
machine and which attacks are likely to succeed, without the attacker
having to run a port scanner. The table also identifies the
currently listening UDP-Lite ports.

The udpliteEndpointMinCoverage provides information about the
requirements of the transport service associated with a specific
UDP-Lite port. This provides additional detail concerning the type
of application associated with the port at the receiver.

Since UDP-Lite permits the delivery of (partially) corrupted data to
an end host, the counters defined in this MIB module may be used to
infer information about the characteristics of the end-to-end path
over which the datagrams are communicated. This information could be
used to infer the type of application associated with the port at the
receiver.

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 implementers consider the security features as provided by the SNMPv3 framework (see RFC 3410 [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, 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.

5. IANA Considerations

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

```
+------------+-------------------------+
<table>
<thead>
<tr>
<th>Descriptor</th>
<th>OBJECT IDENTIFIER value</th>
</tr>
</thead>
<tbody>
<tr>
<td>udpliteMIB</td>
<td>{ mib-2 170 }</td>
</tr>
</tbody>
</table>
+------------+-------------------------+
```

6. Acknowledgments

The design of the MIB module presented in this document owes much to the format of the module presented in [RFC4113].

7. References

7.1. Normative References


7.2. Informative References

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