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Definition of Managed Objects for Lightweight 4over6 Transition Technology
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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 defines objects for managing Lightweight 4over6 transition technology.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on January 5, 2013.

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1. Introduction

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols. In particular, it defines objects for managing the Lightweight 4over6 transition technology. The management of the network address translation function of Lightweight 4over6 initiators is expected to be handled by an updated version of the NAT-MIB [RFC4008], perhaps with a small Lightweight 4over6 specific addition.

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. 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 RFC 2119 [RFC2119].

4. Overview

The MIB module is organized into a group of scalars and tables.
TODO: Add more details!

The OID tree structure of the MIB module is shown below.

```
 --lw4o6Mib(1.3.6.1.2.1.XXXX)
   +--lw4o6Objects(1)
      +--lw4o6IfTable(1)
      |  +--lw4o6IfEntry(1) [lw4o6IfIndex]
      |     +-- --- InterfaceIndex lw4o6IfIndex(1)
      |     +-- rwn Bits           lw4o6IfIcmpControl(2)
      |     +-- r-n Counter32      lw4o6IfBindingMatchFailures(3)
      |     +-- r-n Counter32      lw4o6IfNoBindingFailures(4)
      +--lw4o6BindTable(2)
         +--lw4o6BindEntry(1) [lw4o6BindIfIndex,lw4o6BindIndex]
            +-- --- InterfaceIndex  lw4o6BindIfIndex(1)
            +-- --- BindingIndex    lw4o6BindIndex(2)
            +-- r-n Enumeration     lw4o6BindType(3)
            +-- r-n InetAddressIPv6 lw4o6BindIPv6Address(4)
            +-- r-n InetAddressIPv4 lw4o6BindIPv4Address(5)
            +-- r-n Integer32       lw4o6BindPortRangeValue(6)
            +-- r-n Integer32       lw4o6BindPortRangeMask(7)
            +-- r-n Integer32       lw4o6BindRandomFunction(8)
            +-- r-n Integer32       lw4o6BindRandomStartingPoint(9)
            +-- r-n OctetString     lw4o6BindRandomKey(10)
            +-- r-n Integer32       lw4o6BindNumberOfPorts(11)
            +-- r-n Gauge32         lw4o6BindNumberOfPortsUsed(12)
            +-- r-n Counter32       lw4o6BindPortAllocationFailures(13)
```

5. Relationship to Other MIB Modules

The MIB module IMPORTS definitions from SNMPv2-SMI [RFC2578], SNMPv2-TC [RFC2579], SNMPv2-CONF [RFC2580], SNMP-FRAMEWORK-MIB [RFC3411], IF-MIB [RFC2863], and INET-ADDRESS-MIB [RFC4001].

6. Definitions

```
LW4O6-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE,
    Integer32, Gauge32, Counter32, mib-2
        FROM SNMPv2-SMI                                 -- RFC 2578
    TEXTUAL-CONVENTION
        FROM SNMPv2-TC                                  -- RFC 2579
    OBJECT-GROUP, MODULE-COMPLIANCE
        FROM SNMPv2-CONF                                -- RFC 2580
    InterfaceIndex
        FROM IF-MIB                                     -- RFC 2863
    InetAddressIPv4, InetAddressIPv6
        FROM INET-ADDRESS-MIB;                          -- RFC 4001

lw4o6Mib MODULE-IDENTITY
```

```
    LAST-UPDATED "201207040000Z"


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    DESCRIPTION
        "The MIB module for managing the Lightweight 4over6 transition
         technology.

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         authors of the code.  All rights reserved.

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         (http://trustee.ietf.org/license-info)."

    REVISION "201207040000Z"
    DESCRIPTION
        "Initial version, published as RFC XXXX."
    -- RFC Ed.: replace XXXX with actual RFC number & remove this note
    ::= { mib-2 XXXX }

lw4o6Notifications OBJECT IDENTIFIER ::= { lw4o6Mib 0 }
lw4o6Objects       OBJECT IDENTIFIER ::= { lw4o6Mib 1 }
lw4o6Conformance   OBJECT IDENTIFIER ::= { lw4o6Mib 2 }

-- Textual convention definitions:

BindingIndex ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS      current
    DESCRIPTION
        "A unique value, greater than zero, identifying a Lightweight
         4over6 binding. The value for each binding must remain
         constant at least from one re-initialization of the
         Lightweight 4over6 subsystem to the next re-initialization."
    SYNTAX      Integer32 (1..2147483647)
```

```
 -- Object definitions:

 -- lw4o6IfTable:

 lw4o6IfTable OBJECT-TYPE
     SYNTAX      SEQUENCE OF Lw4o6IfEntry
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
        "The lw4o6IfTable extends the interface table providing
         information about Lightweight 4over6 specific error conditions
         and it controls the interface specific handling of detected
         error situations."
     ::= { lw4o6Objects 1 }

 lw4o6IfEntry OBJECT-TYPE
     SYNTAX      Lw4o6IfEntry
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
        "An entry of the lw4o6IfTable providing information about
         Lightweight 4over6 statistics if an interface."
     INDEX  { lw4o6IfIndex }
     ::= { lw4o6IfTable 1 }

 Lw4o6IfEntry ::= SEQUENCE {
     lw4o6IfIndex                InterfaceIndex,
     lw4o6IfIcmpControl          BITS,
     lw4o6IfBindingMatchFailures Counter32,
     lw4o6IfNoBindingFailures    Counter32
 }

 lw4o6IfIndex OBJECT-TYPE
     SYNTAX      InterfaceIndex
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
        "The network interface the Lightweight 4over6 statistics are
         associated with."
     ::= { lw4o6IfEntry 1 }

 lw4o6IfIcmpControl OBJECT-TYPE
     SYNTAX      BITS { icmpOnMatchFailure(0), icmpOnBindingFailure(1) }
     MAX-ACCESS  read-write
     STATUS      current
     DESCRIPTION
        "This object controls the generation of ICMP messages on certain
         failures.
```

```
         If the icmpOnMatchFailure(0) bit is set, then an ICMP message
         is generated when an encapsulated packet is received that does
         not match a valid binding.

         If the icmpOnBindingFailure(1) bit is set, then an ICMP
         message is generated if a packet is received for which there
         is no valid binding."
     ::= { lw4o6IfEntry 2 }

 lw4o6IfBindingMatchFailures OBJECT-TYPE
     SYNTAX      Counter32
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
        "The number of packets received over this interfaces that have
         been dropped by the concentrator because the IPv6 source
         address of the outer header or the IPv4 source address or the
         port number of the inner header did not match a valid binding."
     ::= { lw4o6IfEntry 3 }

 lw4o6IfNoBindingFailures OBJECT-TYPE
     SYNTAX      Counter32
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
        "The number of packets received over this interfaces that have
         been dropped by the concentrator because the IPv4 address and
         port number of a received IPv4 packet does not match a valid
         binding."
     ::= { lw4o6IfEntry 4 }

 -- lw4o6IfBindTable:

 lw4o6BindTable OBJECT-TYPE
     SYNTAX      SEQUENCE OF Lw4o6BindEntry
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
        "The lw4o6IfBindTable extends the interface table providing
         information about Lightweight 4over6 bindings."
     ::= { lw4o6Objects 2 }

 lw4o6BindEntry OBJECT-TYPE
     SYNTAX      Lw4o6BindEntry
     MAX-ACCESS  not-accessible
     STATUS      current
     DESCRIPTION
        "An entry of the lw4o6IfBindTable providing information about
```

```
        Lightweight 4over6 bindings."
    INDEX  { lw4o6BindIfIndex, lw4o6BindIndex }
    ::= { lw4o6BindTable 1 }

-- DISCUSS: Is the binding table a per interface table or a global
--          table?

Lw4o6BindEntry ::= SEQUENCE {
    lw4o6BindIfIndex               InterfaceIndex,
    lw4o6BindIndex                 BindingIndex,
    lw4o6BindType                  INTEGER,
    lw4o6BindIPv6Address           InetAddressIPv6,
    lw4o6BindIPv4Address           InetAddressIPv4,
    lw4o6BindPortRangeValue        Integer32,
    lw4o6BindPortRangeMask         Integer32,
    lw4o6BindRandomFunction        Integer32,
    lw4o6BindRandomStartingPoint   Integer32,
    lw4o6BindRandomKey             OCTET STRING,
    lw4o6BindNumberOfPorts         Integer32,
    lw4o6BindNumberOfPortsUsed     Gauge32,
    lw4o6BindPortAllocationFailures Counter32
}

lw4o6BindIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
       "The interface the Lightweight 4over6 bindings are
        associated with."
    ::= { lw4o6BindEntry 1 }

lw4o6BindIndex OBJECT-TYPE
    SYNTAX      BindingIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
       "An index uniquely identifying a binding."
    ::= { lw4o6BindEntry 2 }

lw4o6BindType OBJECT-TYPE
    SYNTAX      INTEGER { unknown(0), portrange(1), portrandom(2) }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
       "The port binding type:

        portrange(1)   The port range is specified using a port
```

```
                        range value and a port range mask.

         portrandom(2)

         "
     ::= { lw4o6BindEntry 3 }

 lw4o6BindIPv6Address OBJECT-TYPE
     SYNTAX      InetAddressIPv6
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
        "The IPv6 address used with this binding."
     ::= { lw4o6BindEntry 4 }

 lw4o6BindIPv4Address OBJECT-TYPE
     SYNTAX      InetAddressIPv4
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
        "The IPv4 address used with this binding."
     ::= { lw4o6BindEntry 5 }

 lw4o6BindPortRangeValue OBJECT-TYPE
     SYNTAX      Integer32 (0..65535)
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
        "The port value used with this binding if the binding type
         is portrange."
     REFERENCE
        "draft-bajko-pripaddrassign-04"
     ::= { lw4o6BindEntry 6 }

 lw4o6BindPortRangeMask OBJECT-TYPE
     SYNTAX      Integer32 (0..65535)
     MAX-ACCESS  read-only
     STATUS      current
     DESCRIPTION
        "The port mask used with this binding if the binding type
         is portrange."
     REFERENCE
        "draft-bajko-pripaddrassign-04"
     ::= { lw4o6BindEntry 7 }

 lw4o6BindRandomFunction OBJECT-TYPE
     SYNTAX      Integer32 (0..65535)
     MAX-ACCESS  read-only
```

```
    STATUS      current
    DESCRIPTION
       "The random function used with this binding if the binding type
        is portrandom."
    REFERENCE
       "draft-bajko-pripaddrassign-04"
    ::= { lw4o6BindEntry 8 }

lw4o6BindRandomStartingPoint OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
       "The value used as input to the random function if the
        binding type is portrandom."
    REFERENCE
       "draft-bajko-pripaddrassign-04"
    ::= { lw4o6BindEntry 9 }

lw4o6BindRandomKey OBJECT-TYPE
    SYNTAX      OCTET STRING
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
       "The key used as input to the random function if the
        binding type is portrandom."
    REFERENCE
       "draft-bajko-pripaddrassign-04"
    ::= { lw4o6BindEntry 10 }

lw4o6BindNumberOfPorts OBJECT-TYPE
    SYNTAX      Integer32 (0..65535)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
       "The total number of ports of this binding."
    ::= { lw4o6BindEntry 11 }

lw4o6BindNumberOfPortsUsed OBJECT-TYPE
    SYNTAX      Gauge32 (0..65535)
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
       "The number of ports of this binding that are currently used."
    ::= { lw4o6BindEntry 12 }

lw4o6BindPortAllocationFailures OBJECT-TYPE
    SYNTAX      Counter32
```

```
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
       "The number of situations where a port could not be allocated
        because there we no more ports left in the binding."
    ::= { lw4o6BindEntry 13 }


-- Compliance definitions:

lw4o6Groups      OBJECT IDENTIFIER ::= { lw4o6Conformance 1 }
lw4o6Compliances OBJECT IDENTIFIER ::= { lw4o6Conformance 2 }

lw4o6FullCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "Compliance statement for implementations supporting
         read/write access, according to the object definitions."
    MODULE      -- this module

    MANDATORY-GROUPS {
        lw4o6IfGroup,
        lw4o6BindGroup
    }

    ::= { lw4o6Compliances 1 }

lw4o6ReadOnlyCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "Compliance statement for implementations supporting
         only readonly access."
    MODULE      -- this module

    MANDATORY-GROUPS {
        lw4o6IfGroup,
        lw4o6BindGroup
    }

    OBJECT lw4o6IfIcmpControl
    MIN-ACCESS  read-only
    DESCRIPTION
       "Write access is not required."

    ::= { lw4o6Compliances 2 }

lw4o6IfGroup OBJECT-GROUP
    OBJECTS {
```

```
        -- lw4o6IfIndex,
        lw4o6IfIcmpControl,
        lw4o6IfBindingMatchFailures,
        lw4o6IfNoBindingFailures
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing insight into the
         performance of a Lightweight 4over6 interface."
    ::= { lw4o6Groups 1 }

lw4o6BindGroup OBJECT-GROUP
    OBJECTS {
        -- lw4o6BindIfIndex,
        -- lw4o6BindIndex
        lw4o6BindType,
        lw4o6BindIPv6Address,
        lw4o6BindIPv4Address,
        lw4o6BindPortRangeValue,
        lw4o6BindPortRangeMask,
        lw4o6BindRandomFunction,
        lw4o6BindRandomStartingPoint,
        lw4o6BindRandomKey,
        lw4o6BindNumberOfPorts,
        lw4o6BindNumberOfPortsUsed,
        lw4o6BindPortAllocationFailures
    }
    STATUS      current
    DESCRIPTION
        "A collection of objects providing insight into the
         bindings associated with a Lightweight 4over6 interface."
    ::= { lw4o6Groups 2 }

END
```

7. Security Considerations

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

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:

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 [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.

8. IANA Considerations

IANA is requested to assign a value for "XXXX" under the 'mib-2' subtree and to record the assignment in the SMI Numbers registry. When the assignment has been made, the RFC Editor is asked to replace "XXXX" (here and in the MIB module) with the assigned value and to remove this note.

9. Acknowledgements

TBD

10. References

10.1. Normative References

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[RFC2579] McCloghrie, K., Ed., Perkins, D., Ed., and J.

Schoenwaelder, Ed., "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.

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[RFC4008] Rohit, R., Srisuresh, P., Raghunarayan, R., Pai, N., and C. Wang, "Definitions of Managed Objects for Network Address Translators (NAT)", RFC 4008, March 2005.

10.2. Informative References

[RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.

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