

第 VI 部

ネットワーク管理とセキュリティ

第 6 部

ネットワーク管理とセキュリティ

第 1 章 Introduction

The research topic of WIDE-Netman-Working-Group is a development of technologies for effective management system about distributed system that have large number of equipments. Our research field is a large high-bandwidth network, and we discuss network management, security, and develop tools.

We have been carrying out research and development to make the mobility-aware Internet more manageable and secure in this year.

第 2 章 FCAPS+L: A new network management framework for mobility-aware network

Mobility has brought to fore several implicit assumptions of network management. Several of these need close review in the context of networks which support mobility. The location of a node changes, the RTT between two nodes

NEMO Management Information Base
draft-ietf-mext-nemo-mib-03

Status of this Memo

By submitting this Internet-Draft, each author represents that any applicable patent or other IPR claims of which he or she is aware have been or will be disclosed, and any of which he or she becomes aware will be disclosed, in accordance with Section 6 of BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

may fluctuate over a relatively large range and unreachability is not a definite symptom of failure. We have examined an extension of the framework, for effective management of mobile networks.

We have proposed FCAPS+L, an extension of the management framework, to support Internet mobility. We examined the management issues related to mobility, the information requirements to address these issues and the technology required to make the information available to a manager or management application.

第 3 章 NEMO-MIB: A MIB module for Network Mobility

The Network Mobility (NEMO) Basic Support protocol enables Mobile Networks to attach to different points in the Internet. The protocol is designed so that network mobility is transparent to the nodes inside the Mobile Network. We have revised the structure of the NEMO-MIB. NEMO-MIB is now an extension of the MIPv6-MIB where the MIPv6-MIB tables are augmented to support NEMO.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at <http://www.ietf.org/ietf/1id-abstracts.txt>.

The list of Internet-Draft Shadow Directories can be accessed at <http://www.ietf.org/shadow.html>.

This Internet-Draft will expire on May 25, 2009.

Abstract

This memo defines a portion of the Management Information Base (MIB), the network mobility support (NEMO) MIB, for use with network management protocols in the Internet community. In particular, the NEMO MIB will be used to monitor and control a Mobile IPv6 node with NEMO functionality.

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

2.1. The Mobile IPv6 Protocol and NEMO entities

Mobile IPv6 (MIPv6) [RFC3775] specifies a protocol which allows nodes to remain reachable while moving around in the IPv6 Internet. Network Mobility Basic Support (NEMO) [RFC3963] is an extension to the Mobile IPv6 protocol which facilitates the movement of an entire network. The goals of Network Mobility support and related terminology are discussed in [RFC4886] and [RFC4885], respectively.

Typically mobile routers implement NEMO functionality for achieving network mobility. However, a mobile router may also function as a mobile node. In the context of this document, an entity that

implements the NEMO protocol is a NEMO entity.

This document defines a set of managed objects (MOs) that can be used to monitor and control NEMO entities.

2.2. Implementation Guidance

This document focuses on the management of a NEMO entity. The MIPv6MIB [RFC4295] defines the managed objects for a mobile node. Implementations supporting both the mobile node and NEMO functionality SHOULD implement the managed objects defined for the NEMO entities and mobile nodes from both the MIPv6MIB and NEMOMIB.

2.3. Terminology

The terminology used in this document is consistent with the definitions used in the Mobile IPv6 protocol specification [RFC3775] and the NEMO Basic Support specification [RFC3963].

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14, RFC 2119 [RFC2119].

2.4. MIB Design

The NEMO MIB comprises of the following groups of definitions:

- nemoCore: a generic group containing objects that are common to all the NEMO entities.
- nemoHa: this group models the home agent service. It is composed of objects specific to the services and associated advertisement parameters offered by the home agent on each of its links. It also contains objects pertaining to the maintenance of the home agent list on each of the links on which the service is offered.
- nemoMr: this group models the mobile router service. It is composed of objects specific to the Dynamic Home Agent discovery function and related parameters. It also contains objects that record the movement of the mobile router.
- nemoNotifications: defines the set of notifications that will be used to asynchronously monitor the NEMO entities.

The tables contained in the above groups are as follows:

nemoBindingCacheTable : models the binding cache on the home agent and correspondent node. It contains details of the Binding Update requests that have been received and accepted.

nemoMrEgressIfTable : contains information on the configured egress interfaces.

nemoMrBLTable : models the Binding Update List on the mobile router. It contains information about the registration requests sent by the mobile router and the corresponding results.

nemoHaCounterTable : contains registration statistics for all mobile routers registered with the home agent.

nemoHaMobileNetworkPrefixTable : contains the list of the mobile network prefixes that are maintained by the home agent.

2.5. The NEMO MIB

```

NEMO-MIB DEFINITIONS ::= BEGIN
  IMPORTS
    MODULE-IDENTITY, mib-2, Unsigned32, Counter32,
    Integer32, Gauge32,
    -- Counter64,
    OBJECT-TYPE, NOTIFICATION-TYPE
      FROM SNMPv2-SMI
    TEXTUAL-CONVENTION,
    TruthValue, DateAndTime, TimeStamp
      FROM SNMPv2-TC
    SnmpAdminString
      FROM SNMP-FRAMEWORK-MIB
    MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
      FROM SNMPv2-CONF
    InetAddressType, InetAddress, InetAddressPrefixLength
      FROM INET-ADDRESS-MIB
    InterfaceIndex
      FROM IF-MIB
    mip6BindingHomeAddressType, mip6BindingHomeAddress,
    mip6MnBLEntry, mip6BindingCacheEntry,
    -- mip6MnHomeAddressType, mip6MnHomeAddress,
    mip6MnBLCOAType, mip6MnBLCOA
      FROM MOBILEIPV6-MIB
  ;

nemoMIB MODULE-IDENTITY
  LAST-UPDATED "200811160000Z"          -- 16th November, 2008
  ORGANIZATION "IETF MEXT Working Group"
  CONTACT-INFO
    "          Sri Gundavelli
     Postal: Cisco
           170 W.Tasman Drive,
           San Jose, CA 95134
           USA
     Tel: +1-408-527-6109
     Email: sgundave@cisco.com
  
```

Glenn Mansfield Keeni
 Postal: Cyber Solutions Inc.
 6-6-3, Minami Yoshinari
 Aoba-ku, Sendai, Japan 989-3204.
 Tel: +81-22-303-4012
 Fax: +81-22-303-4015
 E-mail: glenn@cysols.com

Kenichi Nagami
 Postal: INTEC NetCore Inc.
 1-3-3, Shin-suna
 Koto-ku, Tokyo, 135-0075
 Japan
 Tel: +81-3-5665-5069
 E-mail: nagami@inetcore.com

Kazuhide Koide
 Postal: Tohoku University
 Research Institute of Electrical Communication,
 Tohoku University.
 2-1-1 Katahira, Aoba-ku,
 Sendai, Miyagi, Japan 980-8577.
 Tel: +81-22-217-5455
 E-mail: koide@shiratori.riec.tohoku.ac.jp

Support Group E-mail: next@ietf.org

"

DESCRIPTION

"The MIB module for monitoring a NEMO entity.

Copyright (C) The IETF Trust (2008). This
 version of this MIB module is part of RFC XXXX;
 see the RFC itself for full legal notices.

"

-- RFC Ed.: replace XXXX with actual RFC number and remove this
 -- note

REVISION "200811160000Z" -- 16th November 2008
 DESCRIPTION "Initial version, published as RFC XXXX."

-- RFC Ed.: replace XXXX with actual RFC number and remove this
 -- note

::= { mib-2 YYY } -- will be assigned by IANA

W I D E P R O J E C T 2 0 0 8 a n n u a l r e p o r t

```
-- IANA Reg.: Please assign a value for "YYY" under the 'mib-2'
-- subtree and record the assignment in the SMI Numbers
-- registry.
--
-- RFC Ed.: When the above assignment has been made, please
--     remove the above note
--     replace "YYY" here with the assigned value and
--     remove this note.
```

```
-- The NEMO MIB has the following primary groups
```

```
nemoNotifications      OBJECT IDENTIFIER ::= { nemoMIB 0 }
nemoObjects             OBJECT IDENTIFIER ::= { nemoMIB 1 }
nemoConformance        OBJECT IDENTIFIER ::= { nemoMIB 3 }
nemoCore                OBJECT IDENTIFIER ::= { nemoObjects 1 }
nemoMr                  OBJECT IDENTIFIER ::= { nemoObjects 2 }
nemoCn                  OBJECT IDENTIFIER ::= { nemoObjects 3 }
nemoHa                  OBJECT IDENTIFIER ::= { nemoObjects 4 }
```

```
-- The sub groups
```

```
nemoSystem              OBJECT IDENTIFIER ::= { nemoCore 1 }
nemoBindings            OBJECT IDENTIFIER ::= { nemoCore 2 }
nemoConfiguration      OBJECT IDENTIFIER ::= { nemoCore 3 }
nemoStats                OBJECT IDENTIFIER ::= { nemoCore 4 }
```

```
nemoMrSystem            OBJECT IDENTIFIER ::= { nemoMr 1 }
nemoMrConf              OBJECT IDENTIFIER ::= { nemoMr 2 }
nemoMrRegistration      OBJECT IDENTIFIER ::= { nemoMr 3 }
nemoMrGlobalStats       OBJECT IDENTIFIER ::= { nemoMr 4 }
```

```
nemoHaAdvertisement     OBJECT IDENTIFIER ::= { nemoHa 1 }
nemoHaStats             OBJECT IDENTIFIER ::= { nemoHa 2 }
nemoHaRegistration      OBJECT IDENTIFIER ::= { nemoHa 3 }
nemoHaGlobalStats       OBJECT IDENTIFIER ::= { nemoHaStats 1 }
```

```
-- Textual Conventions
```

```
NemoBURequestRejectionCode ::= TEXTUAL-CONVENTION
```

```
    STATUS          current
```

```
    DESCRIPTION
```

```
        "The value of the status field in the Binding
        Acknowledgment message when the Binding Update
        was rejected for NEMO specific reasons.
        "
```

```
    REFERENCE
```

```
        "RFC 3963 : Section 4.2"
```

```
    SYNTAX  INTEGER {
```

```
        mobileRouterOperationNotPermitted (1), --(Code 140)
        invalidPrefix                       (2), --(Code 141)
        notAuthorizedForPrefix              (3), --(Code 142)
        forwardingSetupFailed               (4)  --(Code 143)
```



```

    }

--
--
-- nemoSystem group
--
--

nemoCapabilities OBJECT-TYPE
    SYNTAX      BITS {
                mobileRouter      (0),
                homeAgentSupport  (1)
    }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object indicates the NEMO functions that
        are supported by this managed entity. Multiple
        NEMO functions may be supported by a single
        entity."
    REFERENCE
        "RFC 3963 : Section 3"
    ::= { nemoSystem 1 }

nemoStatus OBJECT-TYPE
    SYNTAX      INTEGER { enabled(1), disabled(2) }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object indicates whether the NEMO
        function is enabled for the managed entity. If it
        is enabled, the agent discovery and registration
        functions will be operational.
        Changing the status from enabled(1) to disabled(2)
        will terminate the agent discovery and registration
        functions. On the other hand, changing the status
        from disabled(2) to enabled(1) will start the agent
        discovery and registration functions.

        The value of this object SHOULD remain unchanged
        across reboots of the managed entity."
    ::= { nemoSystem 2 }

nemoCounterDiscontinuityTime OBJECT-TYPE
    SYNTAX      TimeStamp
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The value of sysUpTime on the most recent occasion
        at which any one or more of this NEMO entity's

```

```

        counters viz, counters with OID prefix 'nemoMrConf'
        or 'nemoMrRegnCounters' or 'nemoMrGlobalStats'
        or 'nemoHaGlobalStats' suffered a discontinuity.
        If no such discontinuities have occurred since the
        last re-initialization of the local management
        subsystem, then this object will have a zero value.
        "
 ::= { nemoStats 1 }
--
--
--   nemoConfiguration group
--
--
nemoMrBLTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF NemoMrBLEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table corresponds to the Binding Update List
        (BL) that includes NEMO related information and
        is maintained by the mobile router. The table
        holds a row for every binding that the mobile
        router has established or is trying to establish.
        Entries from the table are deleted as the lifetime
        of the binding expires.
        "
    REFERENCE
        "RFC 3775 : Section 4.5, 11.1, RFC 3963 : Section 5.2"
 ::= { nemoMrRegistration 1 }

nemoMrBLEntry OBJECT-TYPE
    SYNTAX      NemoMrBLEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry pertaining to nemo-related information
        contained in a Binding Update sent by a nemo-enabled
        mobile router to its home agent.
        "
    AUGMENTS {mip6MnBLEntry}
 ::= { nemoMrBLTable 1 }

NemoMrBLEntry ::= SEQUENCE {
    nemoMrBLMode      INTEGER,
    nemoMrBLMrFlag    TruthValue,
    nemoMrBLHomeAddressPrefixLength  InetAddressPrefixLength,
    nemoMrBLCareofAddressPrefixLength  InetAddressPrefixLength,
    nemoMrBLActiveEgressIfIndex        InterfaceIndex,
    nemoMrBLEstablishedHomeTunnelIfIndex  InterfaceIndex
}

nemoMrBLMode OBJECT-TYPE
    SYNTAX      INTEGER {
        implicitMode (1),

```

```

    explicitMode (2)
        }
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "implicitMode(1): the Mobile Network Prefix Option
    is not included in the Binding Update by the mobile
    router.
    explicitMode(2): the mobile router included one or
    more Mobile Network Prefix Options in the Binding
    Update.
    "
REFERENCE
    "RFC 3963 : Section 5.2"
 ::= { nemoMrBEntry 1 }

nemoMrBLMrFlag OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "true(1): the mobile router sent the Binding Update
    with Mobile Router Flag set.
    false(0): the mobile router did not send the binding
    update with Mobile Router Flag set. This implies that
    the mobile router is acting as a mobile node.
    "
REFERENCE
    "RFC 3963 : Section 4.1, 5.1"
 ::= { nemoMrBEntry 2 }

nemoMrBLHomeAddressPrefixLength OBJECT-TYPE
SYNTAX InetAddressPrefixLength
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The prefix length of the mobile router's home network.
    "
REFERENCE
    "RFC 3963 : Section 3"
 ::= { nemoMrBEntry 3 }

nemoMrBLCareofAddressPrefixLength OBJECT-TYPE
SYNTAX InetAddressPrefixLength
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The prefix length of the care-of Address of the
    mobile router.
    "
REFERENCE
    "RFC 3963 : Section 3"
 ::= { nemoMrBEntry 4 }

```

```

nemoMrBLActiveEgressIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The interface index of the currently active
         egress interface.
        "
    REFERENCE
        "RFC 3963 : Section 5.5"
    ::= { nemoMrBLEntry 5 }

nemoMrBLEstablishedHomeTunnelIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The interface index of the tunnel established
         between the mobile router and the home agent
         for NEMO traffic.
        "
    REFERENCE
        "RFC 3963 : Section 5.5"
    ::= { nemoMrBLEntry 6 }

-- Mobile Router Registration Group Counters

nemoMrRegnCounters OBJECT IDENTIFIER ::= { nemoMrRegistration 2 }

nemoMrMobilityMessagesSent OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of mobility messages, i.e. IPv6
         datagrams with Mobility Header, sent by the mobile
         node. This will include Binding Updates sent by a
         mobile router with the Mobile Router Flag set.
         Discontinuities in the value of this counter can
         occur at re-initialization of the management system,
         and at other times as indicated by the value of
         nemoCounterDiscontinuityTime.
        "
    REFERENCE
        "RFC3775 : Section 4.2, 6.1, RFC 3963: Section 4.1"
    ::= { nemoMrRegnCounters 1 }

nemoMrMobilityMessagesRecd OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION

```

"The total number of mobility messages, i.e. IPv6 datagrams with Mobility Header, received by the mobile node. This will include Binding Acknowledgements with Mobile Router Flag set, that are sent to a mobile router. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoCounterDiscontinuityTime.

"

REFERENCE

"RFC3775 : Section 4.2, 6.1, RFC 3963: Section 4.1, 4.2"

::= { nemoMrRegnCounters 2 }

nemoMrPrefixRegMode OBJECT-TYPE

SYNTAX INTEGER {
 implicitMode (1),
 explicitMode (2)
 }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object indicates the mode in which the mobile network prefixes will be registered with the home agent.
 implicitMode(1): the Mobile Network Prefix Option will not be included in the Binding Update by the mobile router.
 explicitMode(2): the mobile router will include one or more Mobile Network Prefix Options in the Binding Update.

"

REFERENCE

"RFC 3963 : Section 5.2"

::= { nemoMrRegistration 3 }

nemoHaMobileNetworkPrefixTable OBJECT-TYPE

SYNTAX SEQUENCE OF NemoHaMobileNetworkPrefixEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains the mobile network prefixes that the home agent maintains for the Mobile Router. The mobile network prefixes in this table are registered by Binding Updates or are manually pre-configured.

"

REFERENCE

"RFC 3963 : Section 6.1.2"

::= { nemoHaRegistration 1 }

```

nemoHaMobileNetworkPrefixEntry OBJECT-TYPE
    SYNTAX      NemoHaMobileNetworkPrefixEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry for a mobile network prefix.

        The instances of the columnar objects in this entry
        pertain to an interface for a particular value of
        mip6BindingHomeAddressType, mip6BindingHomeAddress,
        and nemoHaMobileNetworkPrefixSeqNo.
        The nemoHaMobileNetworkPrefixSeqNo object is used to
        distinguish between multiple instances of
        the mobile network prefix in the same Binding Update
        for the same set of mip6BindingHomeAddressType and
        mip6BindingHomeAddress.
        There is no upper-bound on the maximum number of
        mobile network prefixes in a Binding Update but, for
        practical purposes, the upper bound of the value
        nemoHaMobileNetworkPrefixSeqNo is set to 1024.

        Implementers need to be aware that if the total
        number of octets in mip6BindingHomeAddress
        exceeds 112, then OIDs of column
        instances in this row will have more than 128
        sub-identifiers and cannot be accessed using
        SNMPv1, SNMPv2c, or SNMPv3.
        "
    INDEX { mip6BindingHomeAddressType,
            mip6BindingHomeAddress,
            nemoHaMobileNetworkPrefixSeqNo
    }
    ::= { nemoHaMobileNetworkPrefixTable 1 }

NemoHaMobileNetworkPrefixEntry ::= SEQUENCE {
    nemoHaMobileNetworkPrefixSeqNo      Integer32,
    nemoHaMobileNetworkPrefixType       InetAddressType,
    nemoHaMobileNetworkPrefix           InetAddress,
    nemoHaMobileNetworkPrefixLength     Unsigned32,
    nemoHaMobileNetworkPrefixSource     INTEGER
}

nemoHaMobileNetworkPrefixSeqNo OBJECT-TYPE
    SYNTAX      Integer32 (1..1024)
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A Binding Update may have multiple mobile network
        prefixes.
        This object along with mip6BindingHomeAddressType,
        and mip6BindingHomeAddress uniquely identifies a
        row containing a single mobile network prefix for
        a mobile router in this table.
        "
    REFERENCE

```

```

"RFC 3963 : Section 2, 6.1, 6.2"
::= { nemoHaMobileNetworkPrefixEntry 1 }

```

```

nemoHaMobileNetworkPrefixType OBJECT-TYPE
SYNTAX      InetAddressType
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The address type for the mobile network prefix
    that follows.
    "
::= { nemoHaMobileNetworkPrefixEntry 2 }

```

```

nemoHaMobileNetworkPrefix OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "A mobile network prefix related to the
    corresponding Binding Update.

    The type of the address represented by this object
    is specified by the corresponding
    nemoHaMobileNetworkPrefixType object.
    "
REFERENCE
    "RFC 3963 : Section 2 , 6.1, 6.2"
::= { nemoHaMobileNetworkPrefixEntry 3 }

```

```

nemoHaMobileNetworkPrefixLength OBJECT-TYPE
SYNTAX      Unsigned32 (0..128)
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The length of the prefix specified by the corresponding
    nemoHaMobileNetworkPrefix Object.
    "
REFERENCE
    "RFC 3963 : Section 4.3, 6.1, 6.2"
::= { nemoHaMobileNetworkPrefixEntry 4 }

```

```

nemoHaMobileNetworkPrefixSource OBJECT-TYPE
SYNTAX      INTEGER {
    configured (1),
    bindingUpdate (2)
}
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The information source of the mobile network prefix
    configured with the Binding Update.

```

configured(1) indicates that mobile network prefix has been manually pre-configured.
 bindingUpdate(2) indicates that the information is introduced to the home agent by the mobile network prefix option in the Binding Updates received by the home agent.

REFERENCE
 "RFC 3963 : Section 4.3, 6.1, 6.2"
 ::= { nemoHaMobileNetworkPrefixEntry 5 }

nemoBindingCacheTable OBJECT-TYPE
 SYNTAX SEQUENCE OF NemoBindingCacheEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "This table models the Binding Cache that includes NEMO related information and is maintained by the home agent. Entries in this table are not required to survive a reboot of the home agent."
 "

REFERENCE
 "RFC 3775 : Section 4.5, 9.1, 10.1,
 RFC 3963 : Section 6.1"
 ::= { nemoBindings 1 }

nemoBindingCacheEntry OBJECT-TYPE
 SYNTAX NemoBindingCacheEntry
 MAX-ACCESS not-accessible
 STATUS current
 DESCRIPTION
 "An entry containing additional information related to nemo-enabled entries in the binding cache table of the home agent."
 "

AUGMENTS {mip6BindingCacheEntry}
 ::= { nemoBindingCacheTable 1 }

NemoBindingCacheEntry ::= SEQUENCE {
 nemoBindingMrFlag TruthValue,
 nemoBindingMrMode INTEGER
 }

nemoBindingMrFlag OBJECT-TYPE
 SYNTAX TruthValue
 MAX-ACCESS read-only
 STATUS current
 DESCRIPTION
 "true(1) indicates that the binding cache entry is from an entity acting as a mobile router.
 false(0) implies that the binding cache entry is from an entity acting as a mobile node."


```

"
REFERENCE
    "RFC 3963 : Section 6.1.1, 6.2"
 ::= { nemoBindingCacheEntry 1 }

nemoBindingMrMode OBJECT-TYPE
SYNTAX      INTEGER {
    implicitMode(1),
    explicitMode(2)
    }
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "implicitMode(1): the Mobile Network Prefix Option is
    not included in the Binding Update by the mobile
    router.
    explicitMode(2): the mobile router included one or
    more Mobile Network Prefix Options in the Binding
    Update.
    "
REFERENCE
    "RFC 3963 : Section 5.2, 6.1.1, 6.2"
 ::= { nemoBindingCacheEntry 2 }

--
-- nemoMrEgressIfTable
--
nemoMrEgressIfTable      OBJECT-TYPE
SYNTAX      SEQUENCE OF NemoMrEgressIfEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "A table representing the egress interfaces that
    will be used by the mobile router for roaming to
    foreign networks. Each entry in this table
    represents a configured egress interface.
    "
 ::= { nemoMrSystem 1 }

nemoMrEgressIfEntry OBJECT-TYPE
SYNTAX      NemoMrEgressIfEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "An entry in the egress interface table. It
    represents a single egress interface entry.
    "
INDEX      { nemoMrEgressIfIndex, nemoMrEgressIfPriority }
 ::= { nemoMrEgressIfTable 1 }

NemoMrEgressIfEntry ::=
    SEQUENCE {

```

```

    nemoMrEgressIfIndex      InterfaceIndex,
    nemoMrEgressIfPriority    Unsigned32,
    nemoMrEgressIfDescription SnmpAdminString,
    nemoMrEgressIfRoamHoldDownTime Gauge32
}

```

```

nemoMrEgressIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The index of the interface on the mobile router.
        "
    ::= { nemoMrEgressIfEntry 1 }

```

```

nemoMrEgressIfPriority OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The priority configured to the egress interface.
        This value will be configured to a value between 0
        and 255.
        "
    ::= { nemoMrEgressIfEntry 2 }

```

```

nemoMrEgressIfDescription OBJECT-TYPE
    SYNTAX      SnmpAdminString
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The description of the egress interface on the
        mobile router, that will be used for roaming to
        foreign networks.
        "
    ::= { nemoMrEgressIfEntry 3 }

```

```

nemoMrEgressIfRoamHoldDownTime OBJECT-TYPE
    SYNTAX      Gauge32
    UNITS       "seconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object indicates the time for which the
        egress interface will be held down during roaming
        to avoid interface flapping.
        "
    ::= { nemoMrEgressIfEntry 4 }

```

```

nemoMrDiscoveryRequests OBJECT-TYPE
    SYNTAX      Counter32

```

```

MAX-ACCESS read-only
STATUS      current
DESCRIPTION
    "Total number of Modified Dynamic Home Agent Address
    Discovery Requests, with Mobile Router Support Flag
    set, sent by the mobile router.
    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of
    nemoCounterDiscontinuityTime.
    "
REFERENCE
    "RFC 3775 : Section 10.5, 11.4.1, RFC 3963: Section 7.1"
    ::= { nemoMrConf 1 }

```

```

nemoMrDiscoveryReplies OBJECT-TYPE
SYNTAX      Counter32
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
    "Total number of Modified Dynamic Home Agent Address
    Discovery Replies, with Mobile Router Support Flag
    set, received by the mobile router.
    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of
    nemoCounterDiscontinuityTime.
    "
REFERENCE
    "RFC 3775 : Section 10.5, 11.4.1, RFC 3963: Section 7.2"
    ::= { nemoMrConf 2 }

```

```

nemoMrDiscoveryRepliesRouterFlagZero OBJECT-TYPE
SYNTAX      Counter32
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
    "Total number of Modified Dynamic Home Agent Address
    Discovery Replies with Mobile Router Support Flag set
    to 0 although the flag in the corresponding request
    is set to 1.
    It implies that there is no home agent that supports
    Mobile Router functionality in the home network.
    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of
    nemoCounterDiscontinuityTime.
    "
REFERENCE
    "RFC 3775 : Section 10.5, 11.4.1, RFC 3963: Section 7.2"
    ::= { nemoMrConf 3 }

```

```

nemoMrMovedHome OBJECT-TYPE
SYNTAX      Counter32

```

```

MAX-ACCESS read-only
STATUS      current
DESCRIPTION
    "Number of times the mobile router has detected
    movement from a foreign network to its home
    network.
    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of
    nemoCounterDiscontinuityTime.
    "
REFERENCE
    "RFC 3963 : Section 3."
    ::= { nemoMrConf 4 }

```

```

nemoMrMovedOutOfHome OBJECT-TYPE
SYNTAX      Counter32
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
    "Number of times the mobile router has detected
    movement to a foreign network from the home
    network, has acquired a care-of address and
    has initiated the care-of address registration
    process.
    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of
    nemoCounterDiscontinuityTime.
    "
REFERENCE
    "RFC 3963 : Section 3."
    ::= { nemoMrConf 5 }

```

```

nemoMrMovedFNtoFN OBJECT-TYPE
SYNTAX      Counter32
MAX-ACCESS read-only
STATUS      current
DESCRIPTION
    "Number of times the mobile router has detected
    movement to/from a foreign network from/to another
    foreign network. Note that 'movement' implies
    movement in layer 3, i.e. the mobile routers care-of
    address changed and it initiated the care-of address
    registration process.
    If there are multiple egress interfaces, this counter
    counts the total number of movements.
    The movement as a mobile node of the mobile entity
    is not counted.
    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of

```

```

        nemoCounterDiscontinuityTime.
    "
REFERENCE
    "RFC 3963 : Section 3."
    ::= { nemoMrConf 6 }

nemoMrBetterIfDetected OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Number of times the NEMO entity has found an egress
        interface with better priority.
        Discontinuities in the value of this counter can
        occur at re-initialization of the management system,
        and at other times as indicated by the value of
        nemoCounterDiscontinuityTime.
        "
    ::= { nemoMrConf 7 }

--
-- nemoStats:nemoMrGlobalStats
--

nemoMrBindingAcksWONemoSupport OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of Binding Acknowledgements without
        NEMO support received by the mobile router.

        Discontinuities in the value of this counter can
        occur at re-initialization of the management system,
        and at other times as indicated by the value of
        nemoCounterDiscontinuityTime.
        "
    REFERENCE
        "RFC 3963 : Section 5.3."
    ::= { nemoMrGlobalStats 1 }

nemoMrBindingAcksRegTypeChangeDisallowed OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of Binding Acknowledgements
        received by the mobile router with status code
        indicating
        'Registration type change disallowed' (Code 139).

```

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoCounterDiscontinuityTime.

"

REFERENCE

"RFC 3775 : Section 9.5.1, RFC 3963 : Section 6.2"

::= { nemoMrGlobalStats 2 }

nemoMrBindingAcksOperationNotPermitted OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of Binding Acknowledgement received by the mobile router with status code indicating 'Mobile Router Operation not permitted' (Code 140).

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoCounterDiscontinuityTime.

"

REFERENCE

"RFC 3963 : Section 6.6"

::= { nemoMrGlobalStats 3 }

nemoMrBindingAcksInvalidPrefix OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of Binding Acknowledgement received by the mobile router with status code indicating 'Invalid Prefix' (Code 141).

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoCounterDiscontinuityTime.

"

REFERENCE

"RFC 3963 : Section 6.6."

::= { nemoMrGlobalStats 4 }

nemoMrBindingAcksNotAuthorizedForPrefix OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

W I D E P R O J E C T 2 0 0 8 a n n u a l r e p o r t

"The total number of Binding Acknowledgements received by the mobile router with status code indicating 'Not Authorized for Prefix' (Code 142).

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoCounterDiscontinuityTime.

"

REFERENCE

"RFC 3963 : Section 6.6."

::= { nemoMrGlobalStats 5 }

nemoMrBindingAcksForwardingSetupFailed OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of Binding Acknowledgements received by the mobile router with status code indicating 'Forwarding Setup failed' (Code 143).

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoCounterDiscontinuityTime.

"

REFERENCE

"RFC 3963 : Section 6.6."

::= { nemoMrGlobalStats 6 }

nemoMrBindingAcksOtherError OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of Binding Acknowledgements received by the mobile router (Mobile Router Flag is set) with status code other than successfully processed , --(Code 0)
 mobileRouterOperationNotPermitted (1), --(Code 140)
 invalidPrefix (2), --(Code 141)
 notAuthorizedForPrefix (3), --(Code 142)
 forwardingSetupFailed (4). --(Code 143)

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoCounterDiscontinuityTime.

"

REFERENCE

```

        "RFC 3963 : Section 6.6."
        ::= { nemoMrGlobalStats 7 }

--
-- nemoStats:nemoHaGlobalStats
--

nemoHaBindingAcksWONemoSupport OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of Binding Acknowledgements
        without NEMO support sent by the home agent.

        Discontinuities in the value of this counter can
        occur at re-initialization of the management system,
        and at other times as indicated by the value of
        nemoCounterDiscontinuityTime."
    REFERENCE
        "RFC 3963 : Section 5.3"
        ::= { nemoHaGlobalStats 1 }

nemoHaBindingAcksRegTypeChangeDisallowed OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of Binding Update requests
        rejected by the home agent with status code
        in the Binding Acknowledgement indicating
        'Registration type change disallowed' (Code 139).

        Discontinuities in the value of this counter can
        occur at re-initialization of the management system,
        and at other times as indicated by the value of
        nemoCounterDiscontinuityTime."
    REFERENCE
        "RFC 3775 : Section 9.5.1, RFC 3963 : Section 6.2"
        ::= { nemoHaGlobalStats 2 }

nemoHaBindingAcksOperationNotPermitted OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The total number of Binding Update requests
        rejected by the home agent with status code in
        the Binding Acknowledgement indicating
        'Mobile Router Operation not permitted'
        (Code 140)."

```


Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoCounterDiscontinuityTime.

"

REFERENCE

"RFC 3963 : Section 6.6"

::= { nemoHaGlobalStats 3 }

nemoHaBindingAcksInvalidPrefix OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of Binding Update requests rejected by the home agent with status code in the Binding Acknowledgement indicating 'Invalid Prefix' (Code 141).

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoCounterDiscontinuityTime.

"

REFERENCE

"RFC 3963 : Section 6.6"

::= { nemoHaGlobalStats 4 }

nemoHaBindingAcksNotAuthorizedForPrefix OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of Binding Update requests rejected by the home agent with status code in the Binding Acknowledgement indicating 'Not Authorized for Prefix' (Code 142).

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoCounterDiscontinuityTime.

"

REFERENCE

"RFC 3963 : Section 6.6"

::= { nemoHaGlobalStats 5 }

nemoHaBindingAcksForwardingSetupFailed OBJECT-TYPE

SYNTAX Counter32

```

MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The total number of Binding Update requests
    rejected by the home agent with status code in
    the Binding Acknowledgement indicating
    'Forwarding Setup failed' (Code 143).

    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of
    nemoCounterDiscontinuityTime.
    "
REFERENCE
    "RFC 3963 : Section 6.6"
    ::= { nemoHaGlobalStats 6 }

nemoHaBindingAcksOtherError OBJECT-TYPE
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
    "The total number of Binding Update requests
    from mobile routers (Mobile Router Flag is
    set) rejected by the home agent with status code
    other than
    mobileRouterOperationNotPermitted (1), --(Code 140)
    invalidPrefix (2), --(Code 141)
    notAuthorizedForPrefix (3), --(Code 142)
    forwardingSetupFailed (4). --(Code 143)

    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of
    nemoCounterDiscontinuityTime.
    "
REFERENCE
    "RFC 3963 : Section 6.6."
    ::= { nemoHaGlobalStats 7 }

nemoHaCounterTable OBJECT-TYPE
SYNTAX SEQUENCE OF NemoHaCounterEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
    "A table containing registration statistics for all
    mobile routers registered with the home agent.
    "
    ::= { nemoHaStats 2 }

nemoHaCounterEntry OBJECT-TYPE
SYNTAX NemoHaCounterEntry
MAX-ACCESS not-accessible
STATUS current

```

DESCRIPTION

"Home agent registration statistics for a mobile router.
Implementors need to be aware that if the total number of octets in mip6BindingHomeAddress exceeds 113 then OIDs of column instances in this row will have more than 128 sub-identifiers and cannot be accessed using SNMPv1, SNMPv2c, or SNMPv3.
"

```
INDEX { mip6BindingHomeAddressType,
        mip6BindingHomeAddress
      }
 ::= { nemoHaCounterTable 1 }
```

```
NemoHaCounterEntry ::= SEQUENCE {
  nemoHaBURequestsAccepted Counter32,
  nemoHaBURequestsDenied Counter32,
  nemoHaBCEntryCreationTime DateAndTime,
  nemoHaBUAcceptedTime DateAndTime,
  nemoHaBURejectionTime DateAndTime,
  nemoHaRecentBURejectionCode NemoBURequestRejectionCode,
  nemoHaCtrDiscontinuityTime TimeStamp
}
```

nemoHaBURequestsAccepted OBJECT-TYPE

```
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
```

DESCRIPTION

"Total number of Binding Update requests from the mobile router accepted by the home agent. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoHaCtrDiscontinuityTime.
"

```
::= { nemoHaCounterEntry 1 }
```

nemoHaBURequestsDenied OBJECT-TYPE

```
SYNTAX Counter32
MAX-ACCESS read-only
STATUS current
```

DESCRIPTION

"Total number of Binding Update requests from the mobile router rejected by the home agent. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of nemoHaCtrDiscontinuityTime.
"

```
::= { nemoHaCounterEntry 2 }
```

nemoHaBCEntryCreationTime OBJECT-TYPE

```
SYNTAX DateAndTime
MAX-ACCESS read-only
```

```

STATUS      current
DESCRIPTION
    "The time when the current Binding Cache entry was
      created for the mobile router.
    "
 ::= { nemoHaCounterEntry 3 }

nemoHaBUAcceptedTime OBJECT-TYPE
SYNTAX      DateAndTime
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The time at which the last Binding Update was
      accepted by the home agent for this mobile router.
    "
 ::= { nemoHaCounterEntry 4 }

nemoHaBURejectionTime OBJECT-TYPE
SYNTAX      DateAndTime
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The time at which the last Binding Update was
      rejected by the home agent for this mobile router.
      If there have been no rejections then this object
      will be inaccessible.
    "
 ::= { nemoHaCounterEntry 5 }

nemoHaRecentBURejectionCode OBJECT-TYPE
SYNTAX      NemoBURequestRejectionCode
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The Status code (>= 128) in the latest Binding
      Acknowledgment indicating a rejection, sent to this
      mobile router.
      In case a Binding Update request is rejected and a
      Binding Acknowledgment is not sent to this mobile
      router then this will be the value of the Status
      code that corresponds to the reason of the rejection.
      If there have been no Binding Update request
      rejections then this object will be inaccessible.
    "
 ::= { nemoHaCounterEntry 6 }

nemoHaCtrDiscontinuityTime OBJECT-TYPE
SYNTAX      TimeStamp
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The value of sysUpTime on the most recent occasion
      at which any one or more of counters in this row
      viz, instances of 'nemoHaBURequestsAccepted' and

```

```

        'nemoHaBURequestsDenied' suffered a discontinuity.
        If no such discontinuity has occurred since the
        last re-initialization of the local management
        subsystem, then this object will have a zero value.
    "
    ::= { nemoHaCounterEntry 7 }

--
--
-- nemoNotifications
--
--

nemoHomeTunnelEstablished NOTIFICATION-TYPE
    OBJECTS {
        nemoMrBLActiveEgressIfIndex,
        nemoMrBLEstablishedHomeTunnelIfIndex,
        mip6MnBLCOAType,
        mip6MnBLCOA,
        nemoMrBLHomeAddressPrefixLength,
        nemoMrBLCareofAddressPrefixLength
    }
    STATUS current
    DESCRIPTION
        "This notification is sent by the mobile router
        every time the tunnel is established between the
        home agent and the mobile router.
        "
    REFERENCE
        "RFC 3963 : Section 5.5"
    ::= { nemoNotifications 1 }

nemoHomeTunnelReleased NOTIFICATION-TYPE
    OBJECTS {
        nemoMrBLActiveEgressIfIndex,
        nemoMrBLEstablishedHomeTunnelIfIndex,
        mip6MnBLCOAType,
        mip6MnBLCOA,
        nemoMrBLHomeAddressPrefixLength,
        nemoMrBLCareofAddressPrefixLength
    }
    STATUS current
    DESCRIPTION
        "This notification is sent by the mobile router
        every time the tunnel is deleted between the home
        agent and the mobile router.
        "
    REFERENCE
        "RFC 3963 : Section 5.5"
    ::= { nemoNotifications 2}

```

```

-- Conformance information
nemoGroups      OBJECT IDENTIFIER ::= { nemoConformance 1 }
nemoCompliances OBJECT IDENTIFIER ::= { nemoConformance 2 }

-- Units of conformance
nemoSystemGroup OBJECT-GROUP
  OBJECTS {
    nemoCapabilities,
    nemoStatus
  }
  STATUS current
  DESCRIPTION
    " A collection of objects for basic NEMO
      monitoring."
  ::= { nemoGroups 1 }

nemoBindingCacheGroup OBJECT-GROUP
  OBJECTS {
    nemoBindingMrFlag,
    nemoBindingMrMode
  }
  STATUS current
  DESCRIPTION
    " A collection of objects for monitoring the
      NEMO extensions of the Binding Cache."
  ::= { nemoGroups 2 }

nemoStatsGroup  OBJECT-GROUP
  OBJECTS {
    nemoCounterDiscontinuityTime
  }
  STATUS current
  DESCRIPTION
    " A collection of objects for
      monitoring NEMO statistics."
  ::= { nemoGroups 3 }

nemoMrConfGroup OBJECT-GROUP
  OBJECTS {
    nemoMrEgressIfDescription,
    nemoMrEgressIfRoamHoldDownTime,
    nemoMrDiscoveryRequests,
    nemoMrDiscoveryReplies,
    nemoMrDiscoveryRepliesRouterFlagZero,
    nemoMrMovedHome,
    nemoMrMovedOutOfHome,
    nemoMrMovedFNtoFN,
    nemoMrBetterIfDetected
  }
  STATUS current
  DESCRIPTION
    " A collection of objects for monitoring
      the configuration-related information on
      the mobile router.
  
```

```

"
 ::= { nemoGroups 4 }

nemoMrRegistrationGroup OBJECT-GROUP
  OBJECTS {
    nemoMrBLMode,
    nemoMrBLMrFlag,
    nemoMrBLHomeAddressPrefixLength,
    nemoMrBLCareofAddressPrefixLength,
    nemoMrBLActiveEgressIfIndex,
    nemoMrBLEstablishedHomeTunnelIfIndex,
    nemoMrMobilityMessagesSent,
    nemoMrMobilityMessagesRecd,
    nemoMrPrefixRegMode,
    nemoMrBindingAcksWONemoSupport,
    nemoMrBindingAcksRegTypeChangeDisallowed,
    nemoMrBindingAcksOperationNotPermitted,
    nemoMrBindingAcksInvalidPrefix,
    nemoMrBindingAcksNotAuthorizedForPrefix,
    nemoMrBindingAcksForwardingSetupFailed,
    nemoMrBindingAcksOtherError
  }
  STATUS current
  DESCRIPTION
    " A collection of objects for monitoring
      the registration details and statistics for
      the mobile router.
    "
  ::= { nemoGroups 5 }

nemoHaSystemGroup OBJECT-GROUP
  OBJECTS {
    nemoHaMobileNetworkPrefixType,
    nemoHaMobileNetworkPrefix,
    nemoHaMobileNetworkPrefixLength,
    nemoHaMobileNetworkPrefixSource
  }
  STATUS current
  DESCRIPTION
    " A collection of objects for basic NEMO
      configuration monitoring at the home agent."
  ::= { nemoGroups 6 }

nemoHaStatsGroup OBJECT-GROUP
  OBJECTS {
    nemoHaBURequestsAccepted,
    nemoHaBURequestsDenied,
    nemoHaBCEnterCreationTime,
    nemoHaBUAcceptedTime,
    nemoHaBURjectionTime,
    nemoHaRecentBURjectionCode,
    nemoHaCtrDiscontinuityTime
  }
  STATUS current
  DESCRIPTION

```

第6部 ネットワーク管理とセキュリティ

```

        " A collection of objects for monitoring
          NEMO registration-related statistics on the
          home agent.
        "
 ::= { nemoGroups 7 }

nemoHaGlobalStatsGroup OBJECT-GROUP
  OBJECTS {
    nemoHaBindingAcksWONemoSupport,
    nemoHaBindingAcksRegTypeChangeDisallowed,
    nemoHaBindingAcksOperationNotPermitted,
    nemoHaBindingAcksInvalidPrefix,
    nemoHaBindingAcksNotAuthorizedForPrefix,
    nemoHaBindingAcksForwardingSetupFailed,
    nemoHaBindingAcksOtherError
  }
  STATUS current
  DESCRIPTION
    " A collection of objects for monitoring basic
      NEMO advertisement and registration statistics
      on a home agent."
  ::= { nemoGroups 8 }

nemoNotificationGroup NOTIFICATION-GROUP
  NOTIFICATIONS {
    nemoHomeTunnelEstablished,
    nemoHomeTunnelReleased
  }
  STATUS current
  DESCRIPTION
    "A collection of notifications from a home agent
      or correspondent node to the Manager about the
      tunnel status of the mobile router.
    "
  ::= { nemoGroups 9 }

-- Compliance statements
nemoCoreCompliance MODULE-COMPLIANCE
  STATUS current
  DESCRIPTION
    "The compliance statement for SNMP entities
      which implement the NEMO-MIB.
    "
  MODULE -- this module
    MANDATORY-GROUPS { nemoSystemGroup
                      }
  ::= { nemoCompliances 1 }

nemoCompliance2 MODULE-COMPLIANCE
  STATUS current
  DESCRIPTION
    "The compliance statement for SNMP entities
```



```

which implement the NEMO-MIB and support
monitoring of the Binding Cache.
There are a number of INDEX objects that cannot be
represented in the form of OBJECT clauses in SMIV2,
but for which there are compliance requirements,
expressed in OBJECT clause form in this description:
-- OBJECT      mip6BindingHomeAddressType
-- SYNTAX      InetAddressType { ipv6(2) }
-- DESCRIPTION
--      This MIB module requires support for global
--      ipv6 addresses for the mip6BindingHomeAddress
--      object.
--
-- OBJECT      mip6BindingHomeAddress
-- SYNTAX      InetAddress (SIZE(16))
-- DESCRIPTION
--      This MIB module requires support for global
--      ipv6 addresses for the mip6BindingHomeAddress
--      object.
--
"
MODULE -- this module
    MANDATORY-GROUPS { nemoSystemGroup,
                       nemoBindingCacheGroup
                     }
 ::= { nemoCompliances 2 }

nemoCoreReadOnlyCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION
    "The compliance statement for SNMP entities
    which implement the NEMO-MIB without support
    for read-write (i.e., in read-only mode).
    "
MODULE -- this module
    MANDATORY-GROUPS { nemoSystemGroup
                     }
OBJECT      nemoStatus
MIN-ACCESS read-only
DESCRIPTION
    "Write access is not required."
 ::= { nemoCompliances 3 }

nemoReadOnlyCompliance2 MODULE-COMPLIANCE
STATUS current
DESCRIPTION
    "The compliance statement for SNMP entities
    which implement the NEMO-MIB without support
    for read-write (i.e., in read-only mode) and
    support monitoring of the Binding Cache.
    There are a number of INDEX objects that cannot be
    represented in the form of OBJECT clauses in SMIV2,
    but for which there are compliance requirements,
    expressed in OBJECT clause form in this description:
    -- OBJECT      mip6BindingHomeAddressType

```

```

-- SYNTAX      InetAddressType { ipv6(2) }
-- DESCRIPTION
--      This MIB module requires support for global
--      ipv6 addresses for the mip6BindingHomeAddress
--      object.
--
-- OBJECT      mip6BindingHomeAddress
-- SYNTAX      InetAddress (SIZE(16))
-- DESCRIPTION
--      This MIB module requires support for global
--      ipv6 addresses for the mip6BindingHomeAddress
--      object.
--
"
MODULE -- this module
    MANDATORY-GROUPS { nemoSystemGroup,
                       nemoBindingCacheGroup
                     }
    OBJECT      nemoStatus
    MIN-ACCESS  read-only
    DESCRIPTION
        "Write access is not required."
    ::= { nemoCompliances 4 }

nemoMrCompliance MODULE-COMPLIANCE
    STATUS      current
    DESCRIPTION
        "The compliance statement for SNMP entities
        which implement the NEMO-MIB for monitoring
        configuration-related information, registration
        details and statistics on a mobile router.
        There are a number of INDEX objects that cannot be
        represented in the form of OBJECT clauses in SMIV2,
        but for which there are compliance requirements,
        expressed in OBJECT clause form in this description:
        -- OBJECT      mip6MnHomeAddressType
        -- SYNTAX      InetAddressType { ipv6(2) }
        -- DESCRIPTION
        --      This MIB module requires support for global
        --      ipv6 addresses for the mip6MnHomeAddress
        --      object.
        --
        -- OBJECT      mip6MnHomeAddress
        -- SYNTAX      InetAddress (SIZE(16))
        -- DESCRIPTION
        --      This MIB module requires support for global
        --      ipv6 addresses for the mip6MnHomeAddress
        --      object.
        --
        -- OBJECT      mip6MnBLNodeAddressType
        -- SYNTAX      InetAddressType { ipv6(2) }
        -- DESCRIPTION
        --      This MIB module requires support for global
        --      ipv6 addresses for the mip6MnBLNodeAddress
        --      object.

```

```

--
-- OBJECT      mip6MnBLNodeAddress
-- SYNTAX      InetAddress (SIZE(16))
-- DESCRIPTION
--      This MIB module requires support for global
--      ipv6 addresses for the mip6MnBLNodeAddress
--      object.
"
MODULE -- this module
    MANDATORY-GROUPS { nemoStatsGroup,
                        nemoMrConfGroup,
                        nemoMrRegistrationGroup
                      }
 ::= { nemoCompliances 5 }

nemoMrReadOnlyCompliance2 MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for SNMP entities
        which implement the NEMO-MIB without support
        for read-write (i.e., in read-only mode) and
        support for monitoring configuration-related
        information, registration details and statistics
        on a mobile router.
        There are a number of INDEX objects that cannot be
        represented in the form of OBJECT clauses in SMIV2,
        but for which there are compliance requirements,
        expressed in OBJECT clause form in this description:
        -- OBJECT      mip6MnHomeAddressType
        -- SYNTAX      InetAddressType { ipv6(2) }
        -- DESCRIPTION
        --      This MIB module requires support for global
        --      ipv6 addresses for the mip6MnHomeAddress
        --      object.
        --
        -- OBJECT      mip6MnHomeAddress
        -- SYNTAX      InetAddress (SIZE(16))
        -- DESCRIPTION
        --      This MIB module requires support for global
        --      ipv6 addresses for the mip6MnHomeAddress
        --      object.
        --
        -- OBJECT      mip6MnBLNodeAddressType
        -- SYNTAX      InetAddressType { ipv6(2) }
        -- DESCRIPTION
        --      This MIB module requires support for global
        --      ipv6 addresses for the mip6MnBLNodeAddress
        --      object.
        --
        -- OBJECT      mip6MnBLNodeAddress
        -- SYNTAX      InetAddress (SIZE(16))
        -- DESCRIPTION
        --      This MIB module requires support for global
        --      ipv6 addresses for the mip6MnBLNodeAddress
        --      object.

```

```

"
MODULE -- this module
    MANDATORY-GROUPS { nemoStatsGroup,
                        nemoMrConfGroup,
                        nemoMrRegistrationGroup
                      }
OBJECT      nemoMrEgressIfDescription
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."

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

OBJECT      nemoMrPrefixRegMode
MIN-ACCESS  read-only
DESCRIPTION
    "Write access is not required."
::= { nemoCompliances 6 }

nemoHaCoreCompliance MODULE-COMPLIANCE
STATUS      current
DESCRIPTION
    "The compliance statement for SNMP entities
    which implement the NEMO-MIB for configuration
    monitoring at the home agent.
    There are a number of INDEX objects that cannot be
    represented in the form of OBJECT clauses in SMIV2,
    but for which there are compliance requirements,
    expressed in OBJECT clause form in this description:
    -- OBJECT      mip6BindingHomeAddressType
    -- SYNTAX      InetAddressType { ipv6(2) }
    -- DESCRIPTION
    --      This MIB module requires support for global
    --      ipv6 addresses for the mip6BindingHomeAddress
    --      object.
    --
    -- OBJECT      mip6BindingHomeAddress
    -- SYNTAX      InetAddress (SIZE(16))
    -- DESCRIPTION
    --      This MIB module requires support for global
    --      ipv6 addresses for the mip6BindingHomeAddress
    --      object.
    --
    "
MODULE -- this module
    MANDATORY-GROUPS { nemoHaSystemGroup
                      }
::= { nemoCompliances 7 }

nemoHaCompliance2 MODULE-COMPLIANCE
STATUS      current
DESCRIPTION

```

```

"The compliance statement for SNMP entities
which implement the NEMO-MIB with support for
monitoring of the home agent functionality
specifically the home-agent-registration-related
statistics.
There are a number of INDEX objects that cannot be
represented in the form of OBJECT clauses in SMIV2,
but for which there are compliance requirements,
expressed in OBJECT clause form in this description:
-- OBJECT      mip6BindingHomeAddressType
-- SYNTAX      InetAddressType { ipv6(2) }
-- DESCRIPTION
--      This MIB module requires support for global
--      ipv6 addresses for the mip6BindingHomeAddress
--      object.
--
-- OBJECT      mip6BindingHomeAddress
-- SYNTAX      InetAddress (SIZE(16))
-- DESCRIPTION
--      This MIB module requires support for global
--      ipv6 addresses for the mip6BindingHomeAddress
--      object.
--
"
MODULE -- this module
    MANDATORY-GROUPS { nemoHaSystemGroup,
                        nemoHaStatsGroup,
                        nemoHaGlobalStatsGroup
                      }
 ::= { nemoCompliances 8 }

nemoNotificationCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for SNMP entities
        which implement the NEMO-MIB and support
        Notification from home agent.
        "
    MODULE -- this module
        MANDATORY-GROUPS { nemoNotificationGroup
                          }
 ::= { nemoCompliances 9 }

END

```

2.6. IANA Considerations

IANA should assign a base arc in the mib-2 (standards track) OID tree for the 'nemoMIB' MODULE-IDENTITY defined in the NEMO MIB.

2.7. Security Considerations

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write. 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:

nemoStatus: The value of this object is used to enable or disable the NEMO functionality on a NEMO entity. Access to this MO may be abused to disrupt the communication that depends on NEMO.

nemoMrPrefixRegMode: The value of this object is used to control the mode in which mobile network prefixes will be registered with the home agent. Access to this object may be abused to disrupt the setting up of mobile network prefixes.

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 address-related objects in this MIB may be considered to be particularly sensitive and/or private. The mobile network prefix- related objects reveal the configuration of the mobile router. This information may be considered to be private and sensitive and must be carefully handled.

nemoHaMobileNetworkPrefixType nemoHaMobileNetworkPrefix
nemoHaMobileNetworkPrefixLength

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.

2.8. Acknowledgments

The authors would like to thank Alex Petrescu, Pascal Thubert, Kent Leung, T.J Kniveton and Thierry Ernst for their review comments on this document.

2.9. References

2.10. Normative References

[RFC2119] Bradner, S., Key words for use in RFCs to Indicate Requirements Levels, BCP 14, RFC 2119, March 1997.

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

[RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, Textual Conventions for SMIv2, STD 58, RFC 2579, April 1999.

[RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, Conformance Statements for SMIv2, STD 58, RFC 2580, April 1999.

[RFC3775] Johnson, D., Perkins, C. and Arkko J., Mobility Support in IPv6 RFC 3775, June 2004.

[RFC3963] Thubert, P., Petrescu, A., Wakikawa, R. and V. Devarapalli, Network Mobility (NEMO) Basic Support Protocol, RFC 3963, Jan 2005.

[RFC4295] Keeni, G., Koide, K., Nagami, K. and S. Gundavelli, The Mobile IPv6 MIB, RFC 4295, April 2006.

2.11. 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.

[RFC4885] T. Ernst and H.-Y. Lach., Network Mobility Support Terminology, RFC 4885, July 2007.

[RFC4886] T. Ernst. Network Mobility Support Goals and Requirements, RFC 4886, July 2007.

Authors' Addresses

Sri Gundavelli
Cisco
170 West Tasman Drive
San Jose, CA 95134
USA

Phone: +1-408-527-6109
Email: sgundave@cisco.com

第6部 ネットワーク管理とセキュリティ

Glenn Mansfield Keeni
Cyber Solutions
6-6-3 Minami Yoshinari, Aoba-ku
Sendai 989-3204,
Japan

Phone: +81-22-303-4012
Email: glenn@cysols.com

Kazuhide Koide
Tohoku University
2-1-1 Katahira, Aoba-ku
Sendai 980-8577,
Japan

Phone: +81-22-217-5455
Email: koide@shiratori.riec.tohoku.ac.jp

Kenichi Nagami
INTEC NetCore
1-3-3, Shin-suna
Koto-ku, Tokyo, 135-0075,
Japan

Phone: +81-3-5665-5069
Email: nagami@inetcore.com

Full Copyright Statement

Copyright (C) The IETF Trust (2008).

This document is subject to the rights, licenses and restrictions contained in BCP 78, and except as set forth therein, the authors retain all their rights.

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY, THE IETF TRUST AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Intellectual Property

The IETF takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights

might or might not be available; nor does it represent that it has made any independent effort to identify any such rights. Information on the procedures with respect to rights in RFC documents can be found in BCP 78 and BCP 79.

Copies of IPR disclosures made to the IETF Secretariat and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF on-line IPR repository at <http://www.ietf.org/ipr>.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at ietf-ipr@ietf.org.

第4章 PMIPv6-MIB: A MIB module for Proxy MobileIPv6

Network-based mobility management protocol enables IP mobility for a host without requiring its participation in any mobility related signaling. This protocol is referred to as Proxy Mobile IPv6 (PMIPv6). We have defined the MIB, the PMIPv6-MIB, for this protocol.

Proxy Mobile IPv6 Management Information Base
<draft-glenn-netlmm-pmipv6-mib-01.txt>

Status of this Memo

By submitting this Internet-Draft, each author represents that any applicable patent or other IPR claims of which he or she is aware have been or will be disclosed, and any of which he or she becomes aware will be disclosed, in accordance with Section 6 of BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

The list of current Internet-Drafts can be accessed at
<http://www.ietf.org/ietf/1id-abstracts.txt>.

The list of Internet-Draft Shadow Directories can be accessed at
<http://www.ietf.org/shadow.html>.

This document is a product of the NETLMM Working Group. Comments should be addressed to the authors or the mailing list at netlmm@ietf.org

This Internet-Draft will expire on May 2, 2009.

Copyright Notice

Copyright (C) The IETF Trust (2008).

Abstract

This memo defines a portion of the Management Information Base (MIB), the Proxy Mobile-IPv6 MIB, for use with network management protocols in the Internet community. In particular, the Proxy Mobile-IPv6 MIB will be used to monitor and control the mobile access gateway node and the local mobility anchor functions of a Proxy Mobile IPv6 (PMIPv6) entity.

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

2.1. The Proxy Mobile IPv6 Protocol and entities

Proxy Mobile IPv6 (MIPv6) [PMIPv6] is an extension to the Mobile IPv6 protocol which facilitates network-based localized mobility management (NETLMM) of IPv6 nodes in a PMIPv6 domain. to remain reachable while moving around in the IPv6 Internet.

2.2. Terminology

The terminology used in this document is consistent with the definitions used in the Mobile IPv6 protocol specification[RFC3775] and in NETLMM Goals document [RFC4831].

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14, RFC 2119 [RFC2119].

3. Proxy Mobile IPv6 Monitoring and Control Requirements

For managing a PMIPv6 entity it is necessary to monitor the following:

- o capabilities of PMIPv6 entities
- o traffic due to PMIPv6 signalling
- o binding related details (at LMA and MAG)
- o binding related statistics (at LMA and MAG)
- o history of Binding Updates (at LMA agent and MAG)

4. MIB Design.

The basic principle has been to keep the MIB as simple as possible and at the same time to make it effective enough so that the essential needs of monitoring and control are met.

It is assumed that the Proxy Mobile IPv6 Management Information Base (PMIPV6-MIB) will always be implemented in conjunction with the MOBILEIPV6-MIB.

The PMIPV6-MIB comprises of the following primary groups:

- o pmip6System
- o pmip6Configuration
- o pmip6Stats
- o pmip6Notifications
- o pmip6Conformance

5. The Proxy Mobile-IPv6 MIB.

```
PMIPV6-MIB DEFINITIONS ::= BEGIN
IMPORTS
MODULE-IDENTITY, mib-2, Integer32, Counter32, Gauge32,
OBJECT-TYPE, NOTIFICATION-TYPE
FROM SNMPv2-SMI
PhysAddress
FROM RFC1213-MIB
TEXTUAL-CONVENTION, TimeStamp,
TruthValue, DateAndTime
FROM SNMPv2-TC
```

```
MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP
    FROM SNMPv2-CONF
InetAddressType, InetAddress, InetAddressPrefixLength
    FROM INET-ADDRESS-MIB
Ipv6AddressIfIdentifierTC
    FROM IP-MIB
mip6MnBEntry, mip6BindingCacheEntry
    FROM MOBILEIPV6-MIB
;
```

pmip6MIB MODULE-IDENTITY

```
LAST-UPDATED "200810250000Z"          -- 10th October, 2008
ORGANIZATION "IETF PMIPV6 Working Group"
CONTACT-INFO
```

```
"          Glenn Mansfield Keeni
Postal: Cyber Solutions Inc.
        6-6-3, Minami Yoshinari
        Aoba-ku, Sendai, Japan 989-3204.
Tel: +81-22-303-4012
Fax: +81-22-303-4015
E-mail: glenn@cysols.com
```

```
          Kazuhide Koide
Postal: Tohoku University
        Research Institute of Electrical
        Communication,
        Tohoku University.
        2-1-1 Katahira, Aoba-ku,
        Sendai, Miyagi, Japan 980-8577.
Tel: +81-22-217-5455
E-mail: koide@shiratori.riec.tohoku.ac.jp
```

```
          Sri Gundavelli
Postal: Cisco
        170 W.Tasman Drive,
        San Jose, CA 95134
        USA
Tel: +1-408-527-6109
Email: sgundave@cisco.com
```

```
          Ryuji Wakikawa
Postal: Keio University
        Department of Environmental
        Information,
        Keio University.
        5322 Endo
        Fujisawa, Kanagawa 252-8520
        Japan
Email: ryuji@sfc.wide.ad.jp
```

Support Group E-mail: netlmm@ietf.org"

W I D E P R O J E C T 2 0 0 8 a n n u a l r e p o r t

```

DESCRIPTION
    "The MIB module for monitoring a PMIPv6 entity.

    Copyright (C) The IETF Trust (2008). This
    version of this MIB module is part of RFC XXXX;
    see the RFC itself for full legal notices.
    "
-- RFC Ed.: replace XXXX with actual RFC number and remove this
-- note

REVISION    "200810250000Z"    -- 25th October 2008
DESCRIPTION "Initial version, published as RFC XXXX."

-- RFC Ed.: replace XXXX with actual RFC number and remove this
-- note

-- ::= { mib-2   YYY }
-- ::= { mib-2   999 } -- will be assigned by IANA

-- IANA Reg.: Please assign a value for "YYY" under the 'mib-2'
-- subtree and record the assignment in the SMI Numbers
-- registry.
--
-- RFC Ed.: When the above assignment has been made, please
-- remove the above note
-- replace "YYY" here with the assigned value and
-- remove this note.

-----
-- Textual Conventions
-----

MNIentifier ::= TEXTUAL-CONVENTION
STATUS      current
DESCRIPTION
    "The identity of a mobile node in the Proxy Mobile IPv6
    domain. This is the stable identifier of a mobile node
    that the mobility entities in a Proxy Mobile IPv6 domain
    can always acquire and use it for predictably identifying
    a mobile node. This is typically an identifier such as
    Network Access Identifier (NAI) [RFC-4282] or other
    identifier such as a Media Access Control (MAC) address.
    "
REFERENCE
    " draft-ietf-netlmm-proxymip6-18.txt : Section 2.2."
SYNTAX  OCTET STRING (SIZE (0..255))

MNLIdentifier ::= TEXTUAL-CONVENTION
STATUS      current

```

DESCRIPTION

"An identifier that identifies the attached interface of a mobile node. For those interfaces that have a link-layer identifier, this identifier can be based on that. The link-layer identifier in some cases is generated by the mobile node and conveyed to the mobile access gateway. This identifier of the attached interface must be stable as seen by any of the mobile access gateways in a given Proxy Mobile IPv6 domain. In some other cases, there might not be any link-layer identifier associated with the mobile node's interface. An identifier value of ALL_ZERO is not considered a valid identifier and cannot be used as an interface identifier.

"

REFERENCE

" draft-ietf-netlmm-proxymip6-18.txt : Section 2.2."

SYNTAX OCTET STRING (SIZE (0..255))

Pmip6PBUAccessTechnologyType ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This specifies the access technology through which the mobile node is connected to the access link on the mobile access gateway.

"

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 8.5."

SYNTAX INTEGER

```
{
    reserved                (0),
    logicalNetworkInterface(1),
    pointToPointInterface  (2),
    ethernet                (3),
    wirelessLan            (4),
    wimax                  (5)
}
```

-- The PMIPV6 MIB has the following 5 primary groups

```
pmip6Notifications      OBJECT IDENTIFIER ::= { pmip6MIB 0 }
pmip6Objects            OBJECT IDENTIFIER ::= { pmip6MIB 1 }
pmip6Conformance       OBJECT IDENTIFIER ::= { pmip6MIB 3 }
pmip6Core               OBJECT IDENTIFIER ::= { pmip6Objects 1 }
pmip6Mag                OBJECT IDENTIFIER ::= { pmip6Objects 2 }
pmip6Lma                OBJECT IDENTIFIER ::= { pmip6Objects 3 }
```

-- The sub groups

```
pmip6System             OBJECT IDENTIFIER ::= { pmip6Core 1 }
pmip6Bindings           OBJECT IDENTIFIER ::= { pmip6Core 2 }
pmip6Conf               OBJECT IDENTIFIER ::= { pmip6Core 3 }
pmip6Stats              OBJECT IDENTIFIER ::= { pmip6Core 4 }
```

```

pmip6MagSystem      OBJECT IDENTIFIER ::= { pmip6Mag 1 }
pmip6MagConf        OBJECT IDENTIFIER ::= { pmip6Mag 2 }
pmip6MagRegistration OBJECT IDENTIFIER ::= { pmip6Mag 3 }

pmip6LmaSystem      OBJECT IDENTIFIER ::= { pmip6Lma 1 }
pmip6LmaConf        OBJECT IDENTIFIER ::= { pmip6Lma 2 }
pmip6LmaRegistration OBJECT IDENTIFIER ::= { pmip6Lma 3 }
pmip6LmaStats       OBJECT IDENTIFIER ::= { pmip6Lma 4 }

-- The pmip6Configuration group has the following sub groups

-- The pmip6Stats group has the following sub groups

pmip6BindingRegCounters OBJECT IDENTIFIER ::= { pmip6Stats 1 }

--
--
-- pmip6System group
--
--
pmip6Capabilities OBJECT-TYPE
    SYNTAX      BITS {
                    mobilityAccessGateway (0),
                    localMobilityAnchor   (1)
                }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object indicates the PMIPv6 functions that
        are supported by this managed entity. Multiple
        Proxy Mobile IPv6 functions may be supported by
        a single entity.
        "
    REFERENCE
        "RFC 3775 : Section 3.2, 4.1"
    ::= { pmip6System 1 }

pmip6Status OBJECT-TYPE
    SYNTAX      INTEGER { enabled(1), disabled(2) }
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This object indicates whether the Proxy Mobile
        IPv6 function is enabled for the managed entity.

        The value of this object SHOULD remain unchanged
        across reboots of the managed entity.
        "
    ::= { pmip6System 2 }

pmip6MobileNodeGeneratedTimestampInUse OBJECT-TYPE

```

```

SYNTAX      TruthValue
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This flag indicates whether or not the mobile node
    generated timestamp mechanism is in use in that
    Proxy Mobile IPv6 domain.
    true(1) if the local mobility anchors and mobile
    access gateways in that Proxy Mobile IPv6 domain
    apply the mobile node generated timestamp
    considerations.
    false(0) indicates that the mobile node generated
    timestamp mechanism is not in use in that Proxy
    Mobile IPv6 domain.
    The default value for this flag is set to value of 0.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.5, 9.3"
    ::= { pmip6Conf 1 }

```

```

pmip6FixedMagLinkLocalAddressOnAllAccessLinksType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The InetAddressType of the
        pmip6FixedMagLinkLocalAddressOnAllAccessLinks
        that follows.
        "
        ::= { pmip6Conf 2 }

```

```

pmip6FixedMagLinkLocalAddressOnAllAccessLinks OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This variable indicates the link-local address value
        that all the mobile access gateways should use on
        any of the access links shared with any of the
        mobile nodes in that Proxy Mobile IPv6 domain. If
        this variable is initialized to ALL_ZERO value, it
        implies the use of fixed link-local address mode is
        not enabled for that Proxy Mobile IPv6 domain."
    REFERENCE
        "draft-ietf-netlmm-proxymip6-18.txt : Section 6.8,
        6.9.1.1, 6.9.3, 9.3"
        ::= { pmip6Conf 3 }

```

```

pmip6FixedMagLinkLayerAddressOnAllAccessLinks OBJECT-TYPE
    SYNTAX      PhysAddress
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This variable indicates the link-layer address value
        that all the mobile access gateways should use on

```



```

        any of the access links shared with any of the mobile
        nodes in that Proxy Mobile IPv6 domain. For access
        technologies where there is no link-layer address,
        this variable MUST be initialized to ALL_ZERO value.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 6.9.3, 9.3"
 ::= { pmip6Conf 4 }

pmip6MagProxyCOATable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Pmip6MagProxyCOAEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table models the Proxy Care-of Addresses configured
        on the egress interfaces of the mobile access gateway
        and is the transport endpoint of the tunnel between the
        local mobility anchor and the mobile access gateway.

        Entries in this table are not required to survive
        a reboot of the managed entity.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 2.2, 6.10."
 ::= { pmip6MagSystem 1 }

pmip6MagProxyCOAEntry OBJECT-TYPE
    SYNTAX      Pmip6MagProxyCOAEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This entry represents a conceptual row in the
        Proxy-CoA table. It represents each Proxy-CoA
        on the mobile access gateway.

        Implementors need to be aware that if the total
        number of octets in mip6BindingHomeAddress
        exceeds 113 then OIDs of column
        instances in this row will have more than 128
        sub-identifiers and cannot be accessed using
        SNMPv1, SNMPv2c, or SNMPv3.
    "
    INDEX { pmip6MagProxyCOAType, pmip6MagProxyCOA }
 ::= { pmip6MagProxyCOATable 1 }

Pmip6MagProxyCOAEntry ::=
    SEQUENCE {
        pmip6MagProxyCOAType  InetAddressType,
        pmip6MagProxyCOA      InetAddress,
        pmip6MagProxyCOAState INTEGER
    }

pmip6MagProxyCOAType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  not-accessible

```

```

STATUS      current
DESCRIPTION
    "The InetAddressType of the pmip6MagProxyCOA
      that follows.
    "
 ::= { pmip6MagProxyCOAEntry 1 }

```

```

pmip6MagProxyCOA OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The Proxy-CoA configured on the egress interface of the
      mobile access gateway.

    The type of the address represented by this object
    is specified by the corresponding
    pmip6MagProxyCOAType object.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 2.2, 6.10."
 ::= { pmip6MagProxyCOAEntry 2 }

```

```

pmip6MagProxyCOAState OBJECT-TYPE
SYNTAX      INTEGER {
                                unknown(1),
                                activated(2),
                                tunneled(3)
                            }
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "This object indicates the state of the Proxy-CoA:
      unknown    -- The state of the Proxy-CoA
                   cannot be determined.
      activated  -- The Proxy-CoA is ready to establish
                   tunnel
      tunneled   -- The Proxy-CoA is used to set up the
                   bi-directional tunnel.
    "
 ::= { pmip6MagProxyCOAEntry 3 }

```

```

pmip6MagEnableMagLocalRouting OBJECT-TYPE
SYNTAX      TruthValue
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "This flag indicates whether or not the mobile access
      gateway is allowed to enable local routing of the
      traffic exchanged between a visiting mobile node and
      a correspondent node that is locally connected to one
      of the interfaces of the mobile access gateway.
      The correspondent node can be another visiting mobile
      node as well, or a local fixed node.
    "

```

true(1) indicates the mobile access gateway routes the traffic locally.

false(0) indicates that the mobile access gateway reverse tunnels all the traffic to the mobile node's local mobility anchor.

The default value for this flag is set to false."

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 9.2."
 ::= { pmip6MagConf 1 }

pmip6MagHomeNetworkPrefixTable OBJECT-TYPE

SYNTAX SEQUENCE OF PMip6MagHomeNetworkPrefixEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"A table representing the Home Network Prefixes assigned to the mobile node's connected interfaces. This table shows the prefixes registered in the binding update list entry.
 "

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 2, 6.1, 6.2"

::= { pmip6MagConf 2 }

pmip6MagHomeNetworkPrefixEntry OBJECT-TYPE

SYNTAX PMip6MagHomeNetworkPrefixEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the Home Network Prefixes table.

Implementers need to be aware that if the total number of octets in pmip6MagHomeNetworkPrefix exceeds 114 then OIDs of column instances in this row will have more than 128 sub-identifiers and cannot be accessed using SNMPv1, SNMPv2c, or SNMPv3.
 "

INDEX { pmip6MagBLMnIdentifier, pmip6MagBLlMnIdentifier,
 pmip6MagHomeNetworkPrefixType,
 pmip6MagHomeNetworkPrefix }

::= { pmip6MagHomeNetworkPrefixTable 1 }

PMip6MagHomeNetworkPrefixEntry ::=

SEQUENCE {

pmip6MagHomeNetworkPrefixType InetAddressType,

pmip6MagHomeNetworkPrefix InetAddress,

pmip6MagHomeNetworkPrefixLength InetAddressPrefixLength,

pmip6MagHomeNetworkPrefixLifeTime Gauge32

};

```

pmip6MagHomeNetworkPrefixType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The InetAddressType of the pmip6MagHomeNetworkPrefix
         that follows.
        "
    ::= { pmip6MagHomeNetworkPrefixEntry 1 }

pmip6MagHomeNetworkPrefix OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The mobile network prefix that is delegated to the
         mobile node. The type of the address represented by
         this object is specified by the corresponding
         pmip6MagHomeNetworkPrefixType object.
        "
    REFERENCE
        "draft-ietf-netlmm-proxymip6-18.txt : Section 2"
    ::= { pmip6MagHomeNetworkPrefixEntry 2 }

pmip6MagHomeNetworkPrefixLength OBJECT-TYPE
    SYNTAX      InetAddressPrefixLength
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The prefix length of the Home Network Prefix.
        "
    ::= { pmip6MagHomeNetworkPrefixEntry 3 }

pmip6MagHomeNetworkPrefixLifeTime OBJECT-TYPE
    SYNTAX      Gauge32
    UNITS       "seconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The lifetime (in seconds) granted to the mobile
         node for this registration.
        "
    REFERENCE
        "draft-ietf-netlmm-proxymip6-18.txt : Section 6.2, 6.7"
    ::= { pmip6MagHomeNetworkPrefixEntry 4 }

```

```

pmip6MagBLTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF Pmip6MnBLEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This table corresponds to the Binding Update List(BL)
        that includes Proxy MIPv6 related information and
        is maintained by the mobile access gateway.
        Entries from the table are deleted as
        the lifetime of the binding expires.
        "
    REFERENCE
        "RFC 3775 : Section 4.5, 11.1,
        draft-ietf-netlmm-proxymip6-18.txt : Section 6.1"
    ::= { pmip6MagRegistration 1 }

pmip6MagBLEntry OBJECT-TYPE
    SYNTAX      Pmip6MnBLEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry containing additional information contained
        in a Binding Update sent by the mobile access gateway
        to the local mobility anchor.
        "
    AUGMENTS { mip6MnBLEntry }
    ::= { pmip6MagBLTable 1 }

Pmip6MnBLEntry ::= SEQUENCE {
    pmip6MagBLFlag                TruthValue,
    pmip6MagBLMnIdentifier         MNIdentifier,
    pmip6MagBLLMnIdentifier       MNLIdentifier,
    pmip6MagBLMagLinkLocalAddressType InetAddressType,
    pmip6MagBLMagLinkLocalAddress InetAddress,
    pmip6MagBLMagIfIdentifierToMn Ipv6AddressIfIdentifierTC,
    pmip6MagBLTunnelIfIdentifier  Ipv6AddressIfIdentifierTC,
    pmip6MagBLAccessTechnologyType Pmip6PBUAccessTechnologyType,
    pmip6MagBLTimeRecentlyAccepted DateAndTime
}

pmip6MagBLFlag OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "true(1) if the mobile access gateway sent the proxy
        binding update with Proxy Registration Flag that
        indicates to the local mobility anchor that the
        registration is the proxy binding update and is from
        a mobile access gateway.
        false(0) implies that the mobile access gateway is
        behaving as a simple mobile node.
        "

```

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 8.1."
 ::= { pmip6MagBLEntry 1 }

pmip6MagBLMnIdentifier OBJECT-TYPE

SYNTAX MNIdentifier
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"The Identifier of the attached mobile node. This identifier is acquired during the mobile node's attachment to the access link.

"

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 2.2, 6.1, 8.1."
 ::= { pmip6MagBLEntry 2 }

pmip6MagBLLMnIdentifier OBJECT-TYPE

SYNTAX MNLLIdentifier
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"The link-layer identifier of the mobile node's connected interface. This can be acquired from the received Router Solicitation messages from the mobile node or during the mobile node's attachment to the access network. If this identifier is not available, this variable length field MUST be set to two (octets) and MUST be initialized to a value of ALL_ZERO.

"

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 2.2, 6.1, 8.1."
 ::= { pmip6MagBLEntry 3 }

pmip6MagBLMagLinkLocalAddressType OBJECT-TYPE

SYNTAX InetAddressType
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"The InetAddressType of the pmip6MagBLMagLinkLocalAddress that follows.

"

::= { pmip6MagBLEntry 4 }

pmip6MagBLMagLinkLocalAddress OBJECT-TYPE

SYNTAX InetAddress
 MAX-ACCESS read-write
 STATUS current
 DESCRIPTION

"The Link-local address of the mobile access gateway on the access link shared with the mobile node. This is the address that is present in the Link-local Address option of the corresponding Proxy Binding Update

```

        message.
    "
REFERENCE
    "RFC 3963 : Section 4.1, 5.1"
 ::= { pmip6MagBLEntry 5 }

pmip6MagBLMagIfIdentifierToMn OBJECT-TYPE
SYNTAX      Ipv6AddressIfIdentifierTC
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "The interface identifier (if-id) of the point-to-point
    link between the mobile node and the mobile access
    gateway. This is internal to the mobile access gateway
    and is used to associate the Proxy Mobile IPv6 tunnel
    to the access link where the mobile node is attached.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 6.1, 8.1."
 ::= { pmip6MagBLEntry 6 }

pmip6MagBLTunnelIfIdentifier OBJECT-TYPE
SYNTAX      Ipv6AddressIfIdentifierTC
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "The tunnel interface identifier (tunnel-if-id) of the
    bi-directional tunnel between the mobile node's local
    mobility anchor and the mobile access gateway. This
    is internal to the mobile access gateway. The tunnel
    interface identifier is acquired during the tunnel
    creation.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 6.1, 8.1."
 ::= { pmip6MagBLEntry 7 }

pmip6MagBLAccessTechnologyType OBJECT-TYPE
SYNTAX      Pmip6PBUAccessTechnologyType
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The type of the access
    technology by which the mobile node is currently
    attached to the mobile access gateway.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 6.9.1.1,
    6.9.1.5, 8.1."
 ::= { pmip6MagBLEntry 8 }

pmip6MagBLTimeRecentlyAccepted OBJECT-TYPE
SYNTAX      DateAndTime
MAX-ACCESS  read-only
STATUS      current

```

DESCRIPTION

"The 64-bit timestamp value of the most recently accepted Proxy Binding Update message sent for this mobile node. This is the time-of-day on the mobile access gateway, when the proxy binding acknowledgement message with the Status field set to 0 was received. If the Timestamp option is not present in the Proxy Binding Update message (i.e., when the sequence number based scheme is in use), the value MUST be set to ALL_ZERO.

"

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 5.1, 8.1"
 ::= { pmip6MagBLEntry 9 }

pmip6MagMnProfileTable OBJECT-TYPE

SYNTAX SEQUENCE OF Pmip6MagMnProfileEntry
 MAX-ACCESS not-accessible
 STATUS current

DESCRIPTION

"This table corresponds to the mobile node's policy profile that includes the essential operational parameters that are required by the network entities for managing the mobile node's mobility service. This table only contains policy profiles of mobile nodes that is connected to the mobile access gateway.

"

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 6.2"
 ::= { pmip6MagRegistration 2 }

pmip6MagMnProfileEntry OBJECT-TYPE

SYNTAX Pmip6MagMnProfileEntry
 MAX-ACCESS not-accessible
 STATUS current

DESCRIPTION

"An entry containing information about the mobile node's policy profile.

"

INDEX { pmip6MagMnIdentifier }

::= { pmip6MagMnProfileTable 1 }

Pmip6MagMnProfileEntry ::=

```
SEQUENCE {
    pmip6MagMnIdentifier                MNIdentifier,
    pmip6MagMnLocalMobilityAnchorAddressType  InetAddressType,
    pmip6MagMnLocalMobilityAnchorAddress  InetAddress
}
```

pmip6MagMnIdentifier OBJECT-TYPE

SYNTAX MNIdentifier
 MAX-ACCESS not-accessible
 STATUS current

DESCRIPTION


```

        "The identity of a mobile node in the Proxy Mobile IPv6
        domain.
        "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 2.2"
 ::= { pmip6MagMnProfileEntry 1 }

pmip6MagMnLocalMobilityAnchorAddressType OBJECT-TYPE
SYNTAX      InetAddressType
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "The InetAddressType of the
    pmip6MagMnLocalMobilityAnchorAddress that follows.
    "
 ::= { pmip6MagMnProfileEntry 2 }

pmip6MagMnLocalMobilityAnchorAddress OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  read-write
STATUS      current
DESCRIPTION
    "The global address that is configured on the interface
    of the local mobility anchor and is the transport
    endpoint of the bi-directional tunnel established
    between the local mobility anchor and the mobile access
    gateway. This is the address to where the mobile
    access gateway sends the Proxy Binding Update messages.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 2.2"
 ::= { pmip6MagMnProfileEntry 3 }

pmip6BindingCacheTable OBJECT-TYPE
SYNTAX      SEQUENCE OF Pmip6BindingCacheEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "This table models the Binding Cache on the local
    mobility anchor.
    Entries from the table are deleted as
    the lifetime of the binding expires.

    Entries in this table are not required to survive
    a reboot of the managed entity.
    "
REFERENCE
    "RFC 3775 : Section 4.5, 9.1, 10.1,
    draft-ietf-netlmm-proxymip6-18.txt : Section 5.1
    "
 ::= { pmip6Bindings 1 }

pmip6BindingCacheEntry OBJECT-TYPE

```

```

SYNTAX      Pmip6BindingCacheEntry
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "An entry containing additional information contained
    in the binding cache table
    of the local mobility anchor.
    "
AUGMENTS {mip6BindingCacheEntry}
 ::= { pmip6BindingCacheTable 1 }

Pmip6BindingCacheEntry ::= SEQUENCE {
    pmip6BindingPBUFlag          TruthValue,
    pmip6BindingMnIdentifier      MNIdentifier,
    pmip6BindingMnLlIdentifier    MNLlIdentifier,
    pmip6BindingMagLinkLocalAddressType  InetAddressType,
    pmip6BindingMagLinkLocalAddress  InetAddress,
    pmip6BindingTunnellIfIdentifier  Ipv6AddressIfIdentifierTC,
    pmip6BindingAccessTechnologyType
                                Pmip6PBUAccessTechnologyType,
    pmip6BindingTimeRecentlyAccepted  DateAndTime
}

pmip6BindingPBUFlag OBJECT-TYPE
SYNTAX      TruthValue
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "true(1) if the local mobility anchor accepted the
    binding update with Proxy Registration Flag from a
    mobile access gateway.
    false(0) implies that the binding cache is from a
    mobile node.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.1, 8.1"
 ::= { pmip6BindingCacheEntry 1 }

pmip6BindingMnIdentifier OBJECT-TYPE
SYNTAX      MNIdentifier
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The identifier of the registered mobile node,
    MN-Identifier. This identifier is obtained from the
    Mobile Node Identifier Option [RFC-4283] present in
    the received Proxy Binding Update message.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 2.2, 5.1,
    8.1"
 ::= { pmip6BindingCacheEntry 2 }

pmip6BindingMnLlIdentifier OBJECT-TYPE
SYNTAX      MNLlIdentifier

```

```

MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The link-layer identifier of the mobile node's
    connected interface on the access link. This
    identifier can be acquired from the Mobile Node
    Link-layer Identifier option, present in the received
    Proxy Binding Update message. If the option was not
    present in the request, this variable length field
    MUST be set to two (octets) and MUST be initialized to
    a value of ALL_ZERO.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 2.2, 5.1,
    8.1"
 ::= { pmip6BindingCacheEntry 3 }

```

```

pmip6BindingMagLinkLocalAddressType OBJECT-TYPE
SYNTAX      InetAddressType
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The InetAddressType of the
    pmip6BindingMagLinkLocalAddress that follows.
    "
 ::= { pmip6BindingCacheEntry 4 }

```

```

pmip6BindingMagLinkLocalAddress OBJECT-TYPE
SYNTAX      InetAddress
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The link-local address of the mobile access gateway on
    the point-to-point link shared with the mobile node.
    This is generated by the local mobility anchor after
    accepting the initial Proxy Binding Update message.
    This is the address that is present in the Link-local
    Address option of the corresponding Proxy Binding
    Acknowledgement message.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.1,
    6.9.1.2, 8.2"
 ::= { pmip6BindingCacheEntry 5 }

```

```

pmip6BindingTunnelIfIdentifier OBJECT-TYPE
SYNTAX      Ipv6AddressIfIdentifierTC
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The tunnel interface identifier (tunnel-if-id) of the
    bi-directional tunnel between the local mobility anchor
    and the mobile access gateway where the mobile node is
    currently anchored. This is internal to the local

```

```

        mobility anchor. The tunnel interface identifier is
        acquired during the tunnel creation.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.1, 8.1"
 ::= { pmip6BindingCacheEntry 6 }

pmip6BindingAccessTechnologyType OBJECT-TYPE
SYNTAX      Pmip6PBUAccessTechnologyType
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The access technology type, by which the mobile node
    is currently attached. This is obtained from the
    Access Technology Type option, present in the Proxy
    Binding Update message.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.1, 8.1"
 ::= { pmip6BindingCacheEntry 7 }

pmip6BindingTimeRecentlyAccepted OBJECT-TYPE
SYNTAX      DateAndTime
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "The 64-bit timestamp value of the most recently
    accepted Proxy Binding Update message sent for this
    mobile node. This is the time-of-day on the local
    mobility anchor, when the message was received. If
    the Timestamp option is not present in the Proxy
    Binding Update message (i.e., when the sequence number
    based scheme is in use), the value MUST be set to
    ALL_ZERO.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.1, 8.1"
 ::= { pmip6BindingCacheEntry 8 }

---
---
--- pmip6Stats group
---
---

--
-- pmip6Stats:pmip6BindingRegcounters
--

pmip6MissingMnIdentifierOption OBJECT-TYPE
SYNTAX      Counter32

```

```

MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
  "Total number of Proxy Binding Update message
  rejected by the local mobility anchor with status
  code in the Binding Acknowledgment message indicating
  'Missing mobile node identifier option' (Code XXX).

  Discontinuities in the value of this counter can
  occur at re-initialization of the mobile router.
  and at other times as indicated by the value of
  pmip6CounterDiscontinuityTime.
  "
REFERENCE
  "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.1,
  8.9"
  ::= { pmip6BindingRegCounters 1 }

```

```

pmip6MagNotAuthorizedForProxyReg OBJECT-TYPE
  SYNTAX      Counter32
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
    "Total number of Proxy Binding Update message
    rejected by the local mobility anchor with status
    code in the Binding Acknowledgment message indicating
    'Not authorized to send proxy binding updates'
    (Code XXX).

    Discontinuities in the value of this counter can
    occur at re-initialization of the mobile router,
    and at other times as indicated by the value of
    pmip6CounterDiscontinuityTime.
    "
  REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.1,
    8.9"
    ::= { pmip6BindingRegCounters 2 }

```

```

pmip6NotLMAForThisMobileNode OBJECT-TYPE
  SYNTAX      Counter32
  MAX-ACCESS  read-only
  STATUS      current
  DESCRIPTION
    "Total number of Proxy Binding Update message rejected
    by the local mobility anchor with status code in the
    Binding Acknowledgment message indicating
    'Not local mobility anchor for this mobile node'
    (Code XXX).

    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of
    pmip6CounterDiscontinuityTime.
    "

```

```

REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.1,
      8.9"
    ::= { pmip6BindingRegCounters 3 }
pmip6ProxyRegNotEnabled OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Total number of Proxy Binding Update message rejected
        by the local mobility anchor with status code in the
        Binding Acknowledgment message indicating
        'Proxy Registration not enabled' (Code XXX).
        Discontinuities in the value of this counter can
        occur at re-initialization of the management system,
        and at other times as indicated by the value of
        pmip6CounterDiscontinuityTime.
        "
    
```

```

REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.1,
      6.9.1.2, 8.9"
    ::= { pmip6BindingRegCounters 4 }

pmip6MissingHomeNetworkPrefixOption OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Total number of Proxy Binding Update message rejected
        by the local mobility anchor with status code in the
        Binding Acknowledgment message indicating
        'Missing home network prefix option' (Code XXX).
        Discontinuities in the value of this counter can
        occur at re-initialization of the management system,
        and at other times as indicated by the value of
        pmip6CounterDiscontinuityTime.
        "
    
```

```

REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.1,
      8.9"
    ::= { pmip6BindingRegCounters 5 }

pmip6MissingHandOffIndicatorOption OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Total number of Proxy Binding Update message rejected
        by the local mobility anchor with status code in the
        Binding Acknowledgment message indicating
        'Missing handoff indicator option' (Code XXX).
        Discontinuities in the value of this counter can
        occur at re-initialization of the management system,
        and at other times as indicated by the value of
    
```

```

        pmip6CounterDiscontinuityTime.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.1,
    8.9"
    ::= { pmip6BindingRegCounters 6 }

pmip6MissingAccessTechTypeOption OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Total number of Proxy Binding Update message rejected
        by the local mobility anchor with status code in the
        Binding Acknowledgment message indicating
        'Missing access technology type option' (Code XXX).
        Discontinuities in the value of this counter can
        occur at re-initialization of the management system,
        and at other times as indicated by the value of
        pmip6CounterDiscontinuityTime.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.1,
    8.9"
    ::= { pmip6BindingRegCounters 7 }

pmip6NotAuthorizedForHomeNetworkPrefix OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Total number of Proxy Binding Update message rejected
        by the local mobility anchor with status code in the
        Binding Acknowledgment message indicating
        'Mobile node not authorized for one or more of the
        requesting home network prefixes' (Code XXX).

        Discontinuities in the value of this counter can
        occur at re-initialization of the management system,
        and at other times as indicated by the value of
        pmip6CounterDiscontinuityTime.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.2,
    6.9.1.2, 8.9"
    ::= { pmip6BindingRegCounters 8 }

pmip6TimestampMismatch OBJECT-TYPE
    SYNTAX      Counter32
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "Total number of Proxy Binding Update message rejected
        by the local mobility anchor with status code in the
        Binding Acknowledgment message indicating

```

'Invalid timestamp value (the clocks are out of sync)'
(Code XXX)

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of pmip6CounterDiscontinuityTime.

"

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 5.5, 6.9.1.2, 8.9"

::= { pmip6BindingRegCounters 9 }

pmip6TimestampLowerThanPrevAccepted OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Total number of Proxy Binding Update message rejected by the local mobility anchor with status code in the Binding Acknowledgment message indicating 'The timestamp value is lower than the previously accepted value' (Code XXX).

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of pmip6CounterDiscontinuityTime.

"

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 5.5, 6.9.1.2, 8.9"

::= { pmip6BindingRegCounters 10 }

pmip6BcePbuPrefixSetDoNotMatch OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Total number of Proxy Binding Update message rejected by the local mobility anchor with status code in the Binding Acknowledgment message indicating 'All the home network prefixes listed in the Binding Cache Entry do not match all the prefixes in the received Proxy Binding Update' (Code XXX).

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of pmip6CounterDiscontinuityTime.

"

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 5.4.1.1, 8.9"

::= { pmip6BindingRegCounters 11 }

pmip6InitialBindingRegistrations OBJECT-TYPE


```

SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Total number of Proxy Binding Update message that
    newly creates the Binding Cache entry.
    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of
    pmip6CounterDiscontinuityTime.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.2"
    ::= { pmip6BindingRegCounters 12 }

```

pmip6BindingLifeTimeExtensionNoHandOff OBJECT-TYPE

```

SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Total number of Proxy Binding Update message for
    extending the binding lifetime, received from the
    same mobile access gateway that last updated the
    binding.
    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of
    pmip6CounterDiscontinuityTime.
    "
REFERENCE
    "rdraft-ietf-netlmm-proxymip6-18.txt : Section 5.3.3"
    ::= { pmip6BindingRegCounters 13 }

```

pmip6BindingLifeTimeExtensionAfterHandOff OBJECT-TYPE

```

SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current
DESCRIPTION
    "Total number of Proxy Binding Update message for
    extending the binding lifetime, received from a new
    mobile access gateway where the mobile node's
    mobility session is handed off.
    Discontinuities in the value of this counter can
    occur at re-initialization of the management system,
    and at other times as indicated by the value of
    pmip6CounterDiscontinuityTime.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.4"
    ::= { pmip6BindingRegCounters 14 }

```

pmip6BindingDeRegistrations OBJECT-TYPE

```

SYNTAX      Counter32
MAX-ACCESS  read-only
STATUS      current

```

W I D E P R O J E C T 2 0 0 8 a n n u a l r e p o r t

DESCRIPTION

"Total number of Proxy Binding Update message with the lifetime value of zero.
Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of pmip6CounterDiscontinuityTime.

"

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.5"
::= { pmip6BindingRegCounters 15 }

pmip6BindingBindingAcks OBJECT-TYPE

SYNTAX Counter32
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"Total number of Proxy Binding Acknowledgement messages.
Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of pmip6CounterDiscontinuityTime.

"

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.5"
::= { pmip6BindingRegCounters 16 }

pmip6CounterDiscontinuityTime OBJECT-TYPE

SYNTAX TimeStamp
MAX-ACCESS read-only
STATUS current

DESCRIPTION

"The value of sysUpTime on the most recent occasion at which any one or more of this PMIPv6 entities global counters, viz., counters with OID prefix 'pmip6BindingRegCounters' suffered a discontinuity. If no such discontinuities have occurred since the last re-initialization of the local management subsystem, then this object will have a zero value.

"

::= { pmip6BindingRegCounters 17 }

pmip6LmaLMAATable OBJECT-TYPE

SYNTAX SEQUENCE OF Pmip6LmaLMAAEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"This table models the LMA Addresses configured on the local mobility anchor and is the transport endpoint of the tunnel between the local mobility anchor and the mobile access gateway. Entries in this table are not required to survive

```

        a reboot of the managed entity.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 2.2, 5.6"
 ::= { pmip6LmaSystem 1 }

pmip6LmaLMAAEntry OBJECT-TYPE
    SYNTAX      Pmip6LmaLMAAEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "This entry represents a conceptual row in the
        LMAA table. It represents each LMAA
        on the local mobility anchor.

        Implementors need to be aware that if the total
        number of octets in mip6BindingHomeAddress
        exceeds 113 then OIDs of column
        instances in this row will have more than 128
        sub-identifiers and cannot be accessed using
        SNMPv1, SNMPv2c, or SNMPv3.
        "
    INDEX { pmip6LmaLMAAType, pmip6LmaLMAA }
 ::= { pmip6LmaLMAAEntryTable 1 }

Pmip6LmaLMAAEntry ::=
    SEQUENCE {
        pmip6LmaLMAAType  InetAddressType,
        pmip6LmaLMAA      InetAddress,
        pmip6LmaLMAAState INTEGER
    }

pmip6LmaLMAAType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The InetAddressType of the pmip6LmaLMAA
        that follows.
        "
 ::= { pmip6LmaLMAAEntry 1 }

pmip6LmaLMAA OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The LMAA configured on the local mobility anchor.

        The type of the address represented by this object
        is specified by the corresponding
        pmip6LmaLMAAType object.
        "
    REFERENCE

```

```
"draft-ietf-netlmm-proxymip6-18.txt : Section 2.2, 5.6"
 ::= { pmip6LmaLMAAEntry 2 }
```

```
pmip6LmaLMAAState OBJECT-TYPE
    SYNTAX      INTEGER {
                                unknown(1),
                                activated(2),
                                tunneled(3)
                            }
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "This object indicates the state of the LMAA:
            unknown    -- The state of the LMAA
                        cannot be determined.
            activated  -- The LMAA is ready to establish
                        tunnel
            tunneled   -- The LMAA is used to set up the
                        bi-directional tunnel.
        "
    ::= { pmip6LmaLMAAEntry 3 }
```

```
pmip6LmaMinDelayBeforeBCEDelete OBJECT-TYPE
    SYNTAX      Integer32 (1..65535)
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "This variable specifies the amount of time in
            milliseconds the local mobility anchor MUST wait before
            it deletes a Binding Cache entry of a mobile node, upon
            receiving a Proxy Binding Update message from a mobile
            access gateway with a lifetime value of 0.
            During this wait time, if the local mobility anchor
            receives a Proxy Binding Update for the same mobility
            binding, with lifetime value greater than 0, then it
            must update the binding cache entry with the accepted
            binding values. By the end of this wait-time, if the
            local mobility anchor did not receive any valid Proxy
            Binding Update message for that mobility binding, it
            MUST delete the Binding Cache entry. This delay
            essentially ensures a mobile node's Binding Cache entry
            is not deleted too quickly and allows some time for the
            new mobile access gateway to complete the signaling for
            the mobile node.

            The default value for this variable is 10000
            milliseconds.
        "
    REFERENCE
        "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3.5, 9.1"
    ::= { pmip6LmaConf 1 }
```

```
pmip6LmaMaxDelayBeforeNewBCEAssign OBJECT-TYPE
    SYNTAX      Integer32 (1..65535)
```

```

MAX-ACCESS read-write
STATUS current
DESCRIPTION
    "This variable specifies the amount of time in
    milliseconds the local mobility anchor MUST wait for
    the de-registration message for an existing mobility
    session before it decides to create a new mobility
    session.
    The default value for this variable is 1500
    milliseconds. Note that there is a dependency between
    this value and the values used in the retransmission
    algorithm for Proxy Binding Updates. The retransmissions
    need to happen before MaxDelayBeforeNewBCEAssign runs
    out, as otherwise there are situations where a
    de-registration from a previous mobile access gateway
    may be lost, and the local mobility anchor creates
    needlessly a new mobility session and new prefixes for
    the mobile node. This affects situations where there
    is no information from the lower layers about the type
    of a handoff or other parameters that can be used for
    identifying the mobility session, however.
    "

```

REFERENCE

```

"draft-ietf-netlmm-proxymip6-18.txt : Section 5.4.1.2,
5.4.1.3, 9.1"
::= { pmip6LmaConf 2 }

```

pmip6LmaTimestampValidityWindow OBJECT-TYPE

```

SYNTAX Integer32 (1..65535)
MAX-ACCESS read-write
STATUS current
DESCRIPTION
    "This variable specifies the maximum amount of time
    difference in milliseconds between the timestamp in the
    received Proxy Binding Update message and the current
    time-of-day on the local mobility anchor, that is
    allowed by the local mobility anchor for the received
    message to be considered valid.
    The default value for this variable is 300 milliseconds.
    This variable must be adjusted to suit the deployments.
    "

```

REFERENCE

```

"draft-ietf-netlmm-proxymip6-18.txt : Section 5.5, 9.1"
::= { pmip6LmaConf 3 }

```

pmip6LmaHomeNetworkPrefixTable OBJECT-TYPE

```

SYNTAX SEQUENCE OF PMip6LmaHomeNetworkPrefixEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
    "A table representing the Home Network Prefixes
    assigned to the mobile node's connected interfaces.
    This table shows the prefixes registered in the
    binding cache entry.
    "

```

REFERENCE

"draft-ietf-netlmm-proxymip6-18.txt : Section 2, 5.1,
5.2"

::= { pmip6LmaConf 4 }

pmip6LmaHomeNetworkPrefixEntry OBJECT-TYPE

SYNTAX PMip6LmaHomeNetworkPrefixEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the Home Network Prefixes table.

Implementers need to be aware that if the total number of octets in pmip6LmaHomeNetworkPrefix exceeds 114 then OIDs of column instances in this row will have more than 128 sub-identifiers and cannot be accessed using SNMPv1, SNMPv2c, or SNMPv3.

"

INDEX { pmip6BindingMnIdentifier,
pmip6BindingMnLlIdentifier,
pmip6MagHomeNetworkPrefixType,
pmip6MagHomeNetworkPrefix }

::= { pmip6LmaHomeNetworkPrefixTable 1 }

PMip6LmaHomeNetworkPrefixEntry ::=

SEQUENCE {

pmip6LmaHomeNetworkPrefixType InetAddressType,
pmip6LmaHomeNetworkPrefix InetAddress,
pmip6LmaHomeNetworkPrefixLength InetAddressPrefixLength,
pmip6LmaHomeNetworkPrefixLifeTime Gauge32

}

pmip6LmaHomeNetworkPrefixType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The InetAddressType of the pmip6LmaHomeNetworkPrefix that follows.

"

::= { pmip6LmaHomeNetworkPrefixEntry 1 }

pmip6LmaHomeNetworkPrefix OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The mobile network prefix that is delegated to the mobile node. The type of the address represented by this object is specified by the corresponding pmip6LmaHomeNetworkPrefixType object.

```

"
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 2"
 ::= { pmip6LmaHomeNetworkPrefixEntry 2 }

pmip6LmaHomeNetworkPrefixLength OBJECT-TYPE
    SYNTAX      InetAddressPrefixLength
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The prefix length of the Home Network Prefix.
        "
    ::= { pmip6LmaHomeNetworkPrefixEntry 3 }

pmip6LmaHomeNetworkPrefixLifeTime OBJECT-TYPE
    SYNTAX      Gauge32
    UNITS       "seconds"
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The lifetime (in seconds) granted to the mobile
        node for this registration.
        "
    REFERENCE
        "draft-ietf-netlmm-proxymip6-18.txt : Section 5.3"
    ::= { pmip6LmaHomeNetworkPrefixEntry 4 }

--
-- pmip6Notifications
--
--

pmip6MagHomeTunnelEstablished NOTIFICATION-TYPE
    OBJECTS {
        pmip6MagBLTunnelIfIdentifier,
        -- pmip6MagProxyCOAType,
        -- pmip6MagProxyCOA
        pmip6MagProxyCOAState
    }
    STATUS      current
    DESCRIPTION
        "This notification is sent by the Proxy MobileIPv6
        entities every time the tunnel is established between
        the local mobility anchor and mobile access gateway.
        "
    REFERENCE
        "draft-ietf-netlmm-proxymip6-18.txt : Section 5.6.1"
    ::= { pmip6Notifications 1 }

pmip6MagHomeTunnelReleased NOTIFICATION-TYPE
    OBJECTS {
        pmip6MagBLTunnelIfIdentifier,

```

```

        -- pmip6MagProxyCOAType,
        -- pmip6MagProxyCOA
        pmip6MagProxyCOAState
    }
STATUS    current
DESCRIPTION
    "This notification is sent by the Proxy MobileIPv6
    entities every time the tunnel between the local
    mobility anchor and mobile access gateway is released.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.6.1"
    ::= { pmip6Notifications 2}

pmip6LmaHomeTunnelEstablished NOTIFICATION-TYPE
OBJECTS   {
    pmip6BindingTunnelIfIdentifier,
    -- pmip6LmaLMAAType,
    -- pmip6LmaLMAA,
    pmip6LmaLMAAState
}
STATUS    current
DESCRIPTION
    "This notification is sent by the Proxy MobileIPv6
    entities every time the tunnel is established between
    the local mobility anchor and mobile access gateway.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.6.1"
    ::= { pmip6Notifications 3 }

pmip6LmaHomeTunnelReleased NOTIFICATION-TYPE
OBJECTS   {
    pmip6BindingTunnelIfIdentifier,
    -- pmip6LmaLMAAType,
    -- pmip6LmaLMAA,
    pmip6LmaLMAAState
}
STATUS    current
DESCRIPTION
    "This notification is sent by the Proxy MobileIPv6
    entities every time the tunnel between the local
    mobility anchor and mobile access gateway is released.
    "
REFERENCE
    "draft-ietf-netlmm-proxymip6-18.txt : Section 5.6.1"
    ::= { pmip6Notifications 4}

-- Conformance information
pmip6Groups      OBJECT IDENTIFIER ::= { pmip6Conformance 1 }
pmip6Compliances OBJECT IDENTIFIER ::= { pmip6Conformance 2 }

-- Units of conformance

```



```

pmip6SystemGroup    OBJECT-GROUP
    OBJECTS {
        pmip6Capabilities,
        pmip6Status,
        -- pmip6MagProxyCOAType,
        -- pmip6MagProxyCOA
        pmip6MagProxyCOAState,
        pmip6LmaLMAAState,
        pmip6MobileNodeGeneratedTimestampInUse,
        pmip6FixedMagLinkLocalAddressOnAllAccessLinksType,
        pmip6FixedMagLinkLocalAddressOnAllAccessLinks,
        pmip6FixedMagLinkLayerAddressOnAllAccessLinks,
        pmip6LmaMinDelayBeforeBCEDelete,
        pmip6LmaMaxDelayBeforeNewBCEAssign,
        pmip6LmaTimestampValidityWindow,
        pmip6LmaHomeNetworkPrefixLength,
        pmip6LmaHomeNetworkPrefixLifeTime
    }
    STATUS    current
    DESCRIPTION
        " A collection of objects for basic PMIPv6
          monitoring."
    ::= { pmip6Groups 1 }

pmip6ConfigurationGroup    OBJECT-GROUP
    OBJECTS {
        -- pmip6MagHomeNetworkPrefixType,
        -- pmip6MagHomeNetworkPrefix,
        pmip6MagHomeNetworkPrefixLength,
        pmip6MagHomeNetworkPrefixLifeTime,
        pmip6MagEnableMagLocalRouting,
        pmip6MagBLFlag,
        pmip6MagBLMnIdentifier,
        pmip6MagBLlMnIdentifier,
        pmip6MagBLMagLinkLocalAddressType,
        pmip6MagBLMagLinkLocalAddress,
        pmip6MagBLMagIfIdentifierToMn,
        pmip6MagBLTunnelIfIdentifier,
        pmip6MagBLAccessTechnologyType,
        pmip6MagBLTimeRecentlyAccepted,
        pmip6BindingPBUFlag,
        pmip6BindingMnIdentifier,
        pmip6BindingMnLlIdentifier,
        pmip6BindingMagLinkLocalAddressType,
        pmip6BindingMagLinkLocalAddress,
        pmip6BindingTunnelIfIdentifier,
        pmip6BindingAccessTechnologyType,
        pmip6BindingTimeRecentlyAccepted,
        -- pmip6MagMnIdentifier,
        pmip6MagMnLocalMobilityAnchorAddressType,
        pmip6MagMnLocalMobilityAnchorAddress,
        pmip6MobileNodeGeneratedTimestampInUse,
        pmip6FixedMagLinkLayerAddressOnAllAccessLinks
    }

```

```

STATUS current
DESCRIPTION
    " A collection of objects for basic PMIPv6
      configuration monitoring."
 ::= { pmip6Groups 2 }

pmip6StatsGroup OBJECT-GROUP
OBJECTS {
    pmip6MissingMnIdentifierOption,
    pmip6MagNotAuthorizedForProxyReg,
    pmip6NotLMAForThisMobileNode,
    pmip6ProxyRegNotEnabled,
    pmip6MissingHomeNetworkPrefixOption,
    pmip6MissingHandOffIndicatorOption,
    pmip6MissingAccessTechTypeOption,
    pmip6NotAuthorizedForHomeNetworkPrefix,
    pmip6TimestampMismatch,
    pmip6TimestampLowerThanPrevAccepted,
    pmip6BcePbuPrefixSetDoNotMatch,
    pmip6InitialBindingRegistrations,
    pmip6BindingLifeTimeExtensionNoHandOff,
    pmip6BindingLifeTimeExtensionAfterHandOff,
    pmip6BindingDeRegistrations,
    pmip6BindingBindingAcks,
    pmip6CounterDiscontinuityTime
}
STATUS current
DESCRIPTION
    " A collection of objects for basic PMIPv6
      monitoring.
    "
 ::= { pmip6Groups 3 }

pmip6MagNotificationGroup NOTIFICATION-GROUP
NOTIFICATIONS {
    pmip6MagHomeTunnelEstablished,
    pmip6MagHomeTunnelReleased
}
STATUS current
DESCRIPTION
    "A collection of notifications from a home agent
    or correspondent node to the Manager about the
    tunnel status of the mobile router.
    "
 ::= { pmip6Groups 4 }

pmip6LmaNotificationGroup NOTIFICATION-GROUP
NOTIFICATIONS {
    pmip6LmaHomeTunnelEstablished,
    pmip6LmaHomeTunnelReleased
}
STATUS current
DESCRIPTION

```

```

        "A collection of notifications from a home agent
        or correspondent node to the Manager about the
        tunnel status of the mobile router.
        "
 ::= { pmip6Groups 5 }

-- Compliance statements
pmip6CoreCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "The compliance statement for SNMP entities
        which implement the MOBILEIPV6-MIB.
        There are a number of INDEX objects that cannot be
        represented in the form of OBJECT clauses in
        SMIV2, but for which there are compliance
        requirements, expressed in OBJECT clause form in
        this
        description:
        -- OBJECT      pmip6BindingHomeAddressType
        -- SYNTAX      InetAddressType { ipv6(2) }
        -- DESCRIPTION
        -- This MIB module requires support for global
        -- ipv6 addresses for the pmip6BindingHomeAddress
        -- object.
        --
        "
    MODULE -- this module
        MANDATORY-GROUPS { pmip6SystemGroup,
                            pmip6ConfigurationGroup,
                            pmip6StatsGroup,
                            pmip6MagNotificationGroup,
                            pmip6LmaNotificationGroup
                            }

 ::= { pmip6Compliances 1 }

END

```

6. Security Considerations

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write. 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 the corresponding 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.

7. IANA Considerations

IANA should assign a base arc in the 'mib-2' (standards track) OID tree for the 'pmip6MIB' MODULE-IDENTITY defined in the PMIPv6 MIB.

8. References

8.1 Normative References

- [RFC2119] Bradner, S., Key words for use in RFCs to Indicate Requirements Levels, BCP 14, RFC 2119, March 1997.
- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, Structure of Management Information Version 2 (SMIv2), STD 58, RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, Textual Conventions for SMIv2, STD 58, RFC 2579, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, Conformance Statements for SMIv2, STD 58, RFC 2580, April 1999.
- [RFC3775] Johnson, D., Perkins, C. and Arkko J., Mobility Support in IPv6 RFC 3775, June 2004.
- [RFC2011bis] Routhier, S., Management Information Base for the Internet Protocol (IP), work in progress (currently <draft-ietf-ipv6-rfc2011-update-10.txt>).

[RFC3291bis] Daniele, M., Haberman, B., Routhier, S. and Schoenwaelder, J., Textual Conventions for Internet Network Addresses, work in progress (currently <draft-ietf-ops-rfc3291bis-06.txt>).

8.2 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.

[RFC4087] Thaler, D., IP Tunnel MIB, RFC 4087, June 2005.

9. Acknowledgments

The following groups and individuals have contributed to this draft with discussions and comments:

WIDE-netman group

10. Authors' Addresses

Glenn Mansfield Keeni
Cyber Solutions Inc.
6-6-3 Minami Yoshinari
Aoba-ku, Sendai 989-3204
Japan

Phone: +81-22-303-4012
EMail: glenn@cysols.com

Kazuhide Koide
Research Institute of Electrical Communication, Tohoku University.
2-1-1 Katahira, Aoba-ku,
Sendai, Miyagi, 980-8577.
Japan

Phone: +81-22-217-5455
E-mail: koide@shiratori.riec.tohoku.ac.jp

Sri Gundavelli
Cisco Systems
170 W.Tasman Drive,
San Jose, CA 95134
USA

Phone: +1-408-527-6109
Email: sgundave@cisco.com

Ryuji Wakikawa
Keio University

Department of Environmental Information, Keio University.
5322 Endo
Fujisawa, Kanagawa 252-8520
Japan

Email: ryuji@sfc.wide.ad.jp

11. Full Copyright Statement

Copyright (C) The IETF Trust (2008).

This document is subject to the rights, licenses and restrictions contained in BCP 78, and except as set forth therein, the authors retain all their rights.

This document and the information contained herein are provided on an "AS IS" basis and THE CONTRIBUTOR, THE ORGANIZATION HE/SHE REPRESENTS OR IS SPONSORED BY (IF ANY), THE INTERNET SOCIETY, THE IETF TRUST AND THE INTERNET ENGINEERING TASK FORCE DISCLAIM ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Intellectual Property

The IETF takes no position regarding the validity or scope of any Intellectual Property Rights or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; nor does it represent that it has made any independent effort to identify any such rights. Information on the procedures with respect to rights in RFC documents can be found in BCP 78 and BCP 79.

Copies of IPR disclosures made to the IETF Secretariat and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this specification can be obtained from the IETF on-line IPR repository at <http://www.ietf.org/ipr>.

The IETF invites any interested party to bring to its attention any copyrights, patents or patent applications, or other proprietary rights that may cover technology that may be required to implement this standard. Please address the information to the IETF at ietf-ipr@ietf.org.

Acknowledgment

Funding for the RFC Editor function is currently provided by the Internet Society.

第 5 章 Conclusions and Future Works

Major progress has been achieved in understanding the requirements of managing the mobility support protocols. Definiton of MIB modules for all the mobility support protocols have been carried out and are in various stages of the standardization process. The implementation followed by large scale deployment, experimentation and evaluation process will be carried out next year.

Copyright Notice

Copyright (C) WIDE Project (2008). All Rights Reserved.