

NEMO Working Group
Internet-Draft
Intended status: Standards Track
Expires: January 10, 2008

Sri Gundavelli
Cisco
Glenn M. Keeni
Cyber Solutions
Kazuhide Koide
Tohoku University
Kenichi Nagami
INTEC NetCore
July 09, 2007

**NEMO Management Information Base
draft-ietf-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.

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 January 10, 2008.

Copyright Notice

Copyright (C) The IETF Trust (2007).

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.

Table of Contents

1.	The Internet-Standard Management Framework	3
2.	Overview	3
2.1.	The Mobile IPv6 Protocol and NEMO entities	3
2.2.	Implementation Guidance	3
2.3.	Terminology	4
3.	MIB Design	4
4.	The NEMO MIB	5
5.	IANA Considerations	38
6.	Security Considerations	39
7.	Acknowledgments	39
8.	References	39
8.1.	Normative References	40
8.2.	Informative References	40
	Authors' Addresses	40
	Intellectual Property and Copyright Statements	42

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 [[NEMOGOAL](#)] and [[NEMOTERM](#)], 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](#)].

3. MIB Design

The NEMO MIB comprises of the following primary groups:

- o nemoSystem
- o nemoConfiguration
- o nemoStats
- o nemoNotifications
- o nemoConformance

The nemoSystem group provides the general information of the NEMO entity. The objects in this group cover the current home registration state.

The nemoConfiguration group contains information relevant to the implementation and operation of the NEMO protocol.

The nemoStats group defines the statistics related to the NEMO protocol operations.

The nemoNotifications group defines the notifications generated by the NEMO entity in response to the operationally interesting state changes in the NEMO protocol.

The nemoConformance group identifies the managed objects that needs to be implemented for conforming to this draft.

4. 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
        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,
    mip6HaListEntry, mip6MnBLEntry, mip6BindingCacheEntry
        FROM MOBILEIPV6-MIB
;
```

nemoMIB MODULE-IDENTITY

```
    LAST-UPDATED "200703040000Z"          -- 4th March, 2007
    ORGANIZATION "IETF NEMO 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
Katahira Campus
Sendai
Japan
Tel: +81-22-217-5454
E-mail: koide@shiratori.riec.tohoku.ac.jp

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

DESCRIPTION

"The MIB module for monitoring a NEMO entity.

Copyright (C) The IETF Trust (2007). 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 "200703040000Z" -- 4th March 2007
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

-- 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 5 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 }

nemoHaAdvertisement	OBJECT IDENTIFIER ::= { nemoHa 1 }
---------------------	------------------------------------

```
-- The nemoConfiguration group has the following sub groups
```

nemoRegistration	OBJECT IDENTIFIER ::= { nemoConfiguration 1 }
------------------	---

```
-- The nemoStats group has the following sub groups
```

nemoHomeAgentDiscovery	OBJECT IDENTIFIER ::= { nemoStats 1 }
nemoBindingRegCounters	OBJECT IDENTIFIER ::= { nemoStats 2 }
nemoRoamingCounters	OBJECT IDENTIFIER ::= { nemoStats 3 }

-- Textual Conventions

NemoStatus ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This object represents the state of the NEMO
entity. The entity could be at home, isolated,
roaming or in unknown state.
"

SYNTAX INTEGER {
 isolated (1),
 roaming (2),
 home (3),
 unknown (4)
}

--

--

-- nemoSystem group

--

--

nemoRoamingStatus OBJECT-TYPE

SYNTAX NemoStatus

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Indicates the current status of the mobile router.
The status indicates if the mobile router is at
home, roaming, isolated or in an unknown state.
"

REFERENCE

"[RFC3963](#) : [Section 3](#)"

::= { nemoSystem 1 }

nemoRegisteredUpTime OBJECT-TYPE

SYNTAX Gauge32

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The time (in seconds) for which the mobile router
has been up and registered with its home agent.
"

REFERENCE

"[RFC3963](#) : [Section 6.4](#)"


```
::= { nemoSystem 2 }
```

nemoLastAcceptedRegTime OBJECT-TYPE

SYNTAX DateAndTime

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The timestamp when the last registration was
accepted by the home agent.
"

REFERENCE

"[RFC3963](#) : [Section 6.6](#)"

```
::= { nemoSystem 3 }
```

nemoLastRejectedRegTime OBJECT-TYPE

SYNTAX DateAndTime

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The timestamp when the last registration was
rejected by the home agent.
"

REFERENCE

"[RFC3963](#) : [Section 6.6](#)"

```
::= { nemoSystem 4 }
```

nemoTimeSinceLastRoamed OBJECT-TYPE

SYNTAX Gauge32

UNITS "seconds"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The time elapsed (in seconds) since the last time
the mobile router roamed.
"

REFERENCE

"[RFC3963](#) : [Section 6.6](#)"

```
::= { nemoSystem 5 }
```

nemoRegHomeAgentAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The address type of the nemoRegHomeAgentAddress
that follows.

"

REFERENCE

"[RFC3963](#) : [Section 3](#)"

::= { nemoSystem 6 }

nemoRegHomeAgentAddress OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The home agent address of the mobile router which
was used in the last accepted registration.

"

REFERENCE

"[RFC3963](#) : [Section 3](#)"

::= { nemoSystem 7 }

nemoRegHomeAddressType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The address type of the nemoRegHomeAddress that
follows.

"

REFERENCE

"[RFC3963](#) : [Section 3](#)"

::= { nemoSystem 8 }

nemoRegHomeAddress OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The home address of the mobile router which is
used in the last accepted registration.

"

REFERENCE

"[RFC3963](#) : [Section 3](#)"

::= { nemoSystem 9 }

nemoRegHomeAddressPrefixLength OBJECT-TYPE

SYNTAX InetAddressPrefixLength
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The prefix length of the home address that the
 mobile router is using for roaming."
REFERENCE
 "[RFC3963](#) : [Section 3](#)"
::= { nemoSystem 10 }

nemoRegCareofAddressType OBJECT-TYPE

SYNTAX InetAddressType
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The address type of the nemoRegCareofAddress that
 follows."
REFERENCE
 "[RFC3963](#) : [Section 3](#)"
::= { nemoSystem 11 }

nemoRegCareofAddress OBJECT-TYPE

SYNTAX InetAddress
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The care-of address of the mobile router which is
 used in the last accepted registration."
REFERENCE
 "[RFC3963](#) : [Section 3](#)"
::= { nemoSystem 12 }

nemoRegCareofAddressPrefixLength OBJECT-TYPE

SYNTAX InetAddressPrefixLength
MAX-ACCESS read-only
STATUS current
DESCRIPTION
 "The prefix length of the care-of Address that the
 mobile router currently is using for roaming."
REFERENCE
 "[RFC3963](#) : [Section 3](#)"


```
::= { nemoSystem 13 }
```

nemoActiveRoamingIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The interface index of the current active
roaming interface.
"

REFERENCE

"[RFC3963](#) : [Section 5.5](#)"

```
::= { nemoSystem 14 }
```

nemoEstablishedHomeTunnelIfIndex 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

"[RFC3963](#) : [Section 5.5](#)"

```
::= { nemoSystem 15 }
```

```
--
```

```
--
```

```
-- nemoConfiguration group
```

```
--
```

```
--
```

```
--
```

```
-- nemoRegistration sub group
```

```
--
```

nemoHomeRegLifeTime OBJECT-TYPE

SYNTAX Gauge32 (4..262143)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The lifetime requested by the mobile router (in
seconds) in the Binding registration. It is
between 4 and 262143 secs.


```
"  
 ::= { nemoRegistration 1 }
```

nemoHomeRegRetryCount OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The maximum number of registration attempts
allowed for the mobile router.
"

```
 ::= { nemoRegistration 2 }
```

nemoHomeRegRetryDelay OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The delay time between successive registration
attempts by the mobile router(in seconds).
"

```
 ::= { nemoRegistration 3 }
```

nemoHomeRegExtendBeforeExpiry OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The time before the registration extension is
attempted (in seconds) by the mobile router.
"

```
 ::= { nemoRegistration 4 }
```

nemoDynamicHADiscovery OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This object indicates whether or not the mobile
router should attempt to make dynamic home agent
address discovery(DHAAD).
"

```
 ::= { nemoRegistration 5 }
```


nemoHomeAddressIdentifierType OBJECT-TYPE

SYNTAX BITS {
 eui64 (0),
 random (1)
 }

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The type of the nemoHomeAddressIdentifier
that follows.
"

::= { nemoRegistration 6 }

nemoHomeAddressIdentifierInetType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The InetAddressType of the
nemoHomeAddressIdentifier that follows.
"

::= { nemoRegistration 7 }

nemoHomeAddressIdentifier OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The unicast routable address assigned to the
mobile router. This is used as the permanent
address of the mobile router in the sense that it
remains unchanged regardless of the mobile
router's current point of attachment.
The type of the address represented by this object
is specified by the corresponding
nemoHomeAddressIdentifierInetType object.
"

::= { nemoRegistration 8 }

nemoHomeIfIndex OBJECT-TYPE

SYNTAX InterfaceIndex

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"The interface index of the mobile router where the
home address is configured.

"
 ::= { nemoRegistration 9 }

nemoPrefixRegMode OBJECT-TYPE
SYNTAX BITS {
 other (0),
 implicitMode (1),
 explicitMode (2)
 }
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "This object indicates if the mobile router will
 explicitly register all the prefixes."
REFERENCE
 "[RFC 3963](#) : [Section 5.2](#)"
 ::= { nemoRegistration 10 }

nemoRegisterConnectedPrefixes OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-write
STATUS current
DESCRIPTION
 "This object indicates if the mobile router will
 register all the connected prefixes."
 ::= { nemoRegistration 11 }

nemoHomeNetworkPrefixTable OBJECT-TYPE
SYNTAX SEQUENCE OF NemoHomeNetworkPrefixEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
 "A table representing the potential home networks
 that the mobile router can use"
 ::= { nemoRegistration 12 }

nemoHomeNetworkPrefixEntry OBJECT-TYPE
SYNTAX NemoHomeNetworkPrefixEntry
MAX-ACCESS not-accessible
STATUS current

DESCRIPTION

"An entry in the binding cache table. It represents a single home network entry

Implementers need to be aware that if the total number of octets in nemoHomeNetworkPrefix 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 { nemoHomeNetworkPrefixType, nemoHomeNetworkPrefix,
nemoHomeNetworkPrefixLength }
::= { nemoHomeNetworkPrefixTable 1 }

NemoHomeNetworkPrefixEntry ::=

```
SEQUENCE {
    nemoHomeNetworkPrefixType      InetAddressType,
    nemoHomeNetworkPrefix          InetAddress,
    nemoHomeNetworkPrefixLength    InetAddressPrefixLength,
    nemoHomeNetworkPrefixLifeTime  Gauge32
}
```

nemoHomeNetworkPrefixType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The InetAddressType of the nemoHomeNetworkPrefix that follows.

"

::= { nemoHomeNetworkPrefixEntry 1 }

nemoHomeNetworkPrefix OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The prefix of the home network which is configured for the mobile router.

"

::= { nemoHomeNetworkPrefixEntry 2 }

nemoHomeNetworkPrefixLength OBJECT-TYPE


```
SYNTAX      InetAddressPrefixLength
MAX-ACCESS  not-accessible
STATUS      current
DESCRIPTION
    "The length of the home network prefix which
    is configured for the mobile router.
    "
 ::= { nemoHomeNetworkPrefixEntry 3 }
```

```
nemoHomeNetworkPrefixLifeTime  OBJECT-TYPE
    SYNTAX      Gauge32 (4..262143)
    MAX-ACCESS  read-write
    STATUS      current
    DESCRIPTION
        "The lifetime requested by the mobile router (in
        seconds) in the Binding registration. It is
        between 4 and 262143 secs.
        "
    ::= { nemoHomeNetworkPrefixEntry 4 }
```

```
--
-- nemoPrefixTable
--
```

```
nemoPrefixTable  OBJECT-TYPE
    SYNTAX      SEQUENCE OF NemoPrefixEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "A table representing the NEMO prefixes.
        "
    REFERENCE
        "RFC 3963 : Section 6.1.2"
    ::= { nemoConfiguration 2 }
```

```
nemoPrefixEntry  OBJECT-TYPE
    SYNTAX      NemoPrefixEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "An entry in the binding cache table. It represents
        a single Binding Update.
```


Implementers need to be aware that if the total number of octets in nemoPrefix 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 { mip6BindingHomeAddressType, mip6BindingHomeAddress,
        nemoPrefixType, nemoPrefix, nemoPrefixLength }
 ::= { nemoPrefixTable 1 }
```

NemoPrefixEntry ::=

```
SEQUENCE {
    nemoPrefixType      InetAddressType,
    nemoPrefix          InetAddress,
    nemoPrefixLength    InetAddressPrefixLength,
    nemoPrefixLifeTime  Gauge32
}
```

nemoPrefixType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The InetAddressType of the nemoPrefix that follows.

"

```
::= { nemoPrefixEntry 1 }
```

nemoPrefix OBJECT-TYPE

SYNTAX InetAddress

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The mobile network prefix that is delegated to the mobile router and advertised in the mobile network. The type of the address represented by this object is specified by the corresponding nemoPrefixType object.

"

REFERENCE

"[RFC 3963](#) : [Section 6.1.2](#)"

```
::= { nemoPrefixEntry 2 }
```



```
nemoPrefixLength    OBJECT-TYPE
    SYNTAX            InetAddressPrefixLength
    MAX-ACCESS        not-accessible
    STATUS            current
    DESCRIPTION
        "The prefix length of the mobile network prefix.
        "
    ::= { nemoPrefixEntry 3 }
```

```
nemoPrefixLifeTime  OBJECT-TYPE
    SYNTAX            Gauge32
    UNITS             "seconds"
    MAX-ACCESS        read-only
    STATUS            current
    DESCRIPTION
        "The lifetime (in seconds) granted to the mobile
        router for this registration.
        "
    ::= { nemoPrefixEntry 4 }
```

```
--
-- nemoRoamingIfTable
--
```

```
nemoRoamingIfTable    OBJECT-TYPE
    SYNTAX            SEQUENCE OF NemoRoamingIfEntry
    MAX-ACCESS        not-accessible
    STATUS            current
    DESCRIPTION
        "A table representing the roaming interfaces.
        Each entry represents a configured roaming
        interface with the roaming characteristics.
        "
    ::= { nemoConfiguration 3 }
```

```
nemoRoamingIfEntry OBJECT-TYPE
    SYNTAX            NemoRoamingIfEntry
    MAX-ACCESS        not-accessible
    STATUS            current
    DESCRIPTION
        "An entry in the roaming interface table. It
        represents a single roaming interface entry.
        "
    INDEX { nemoRoamingIfIndex, nemoRoamingIfPriority }
```



```
::= { nemoRoamingIfTable 1 }
```

```
NemoRoamingIfEntry ::=
```

```
    SEQUENCE {  
        nemoRoamingIfIndex      InterfaceIndex,  
        nemoRoamingIfPriority    Unsigned32,  
        nemoRoamingIfDescription SnmpAdminString,  
        nemoRoamingIfRoamHoldDownTime Gauge32  
    }
```

```
nemoRoamingIfIndex OBJECT-TYPE
```

```
    SYNTAX      InterfaceIndex
```

```
    MAX-ACCESS  not-accessible
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "The index of the interface that will be used for  
        roaming to foreign networks in the mobile router."  
    "
```

```
::= { nemoRoamingIfEntry 1 }
```

```
nemoRoamingIfPriority OBJECT-TYPE
```

```
    SYNTAX      Unsigned32
```

```
    MAX-ACCESS  not-accessible
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "The priority configured to the interface.  
        This value will be configured between 0 and 255."  
    "
```

```
::= { nemoRoamingIfEntry 2 }
```

```
nemoRoamingIfDescription OBJECT-TYPE
```

```
    SYNTAX      SnmpAdminString
```

```
    MAX-ACCESS  read-only
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "The description of the interface that will be used  
        for roaming to foreign networks in the mobile  
        router."  
    "
```

```
::= { nemoRoamingIfEntry 3 }
```

```
nemoRoamingIfRoamHoldDownTime OBJECT-TYPE
```

```
    SYNTAX      Gauge32
```



```
UNITS          "seconds"
MAX-ACCESS     read-only
STATUS         current
DESCRIPTION
    "This object indicates the time for which hold on
    to the interface. This value is configured to
    avoid interface flapping.
    "
 ::= { nemoRoamingIfEntry 4 }
```

```
nemoHaListTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF NemoHaListEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "This table models the Home Agents List that contains
        the list of all routers that are acting as
        home agents with NEMO functionality on
        each of the interfaces on which the home agent service
        is offered by this router.
        "
    REFERENCE
        "RFC 3963 : Section 7.2, 7.3"
    ::= { nemoHaAdvertisement 1 }
```

```
nemoHaListEntry OBJECT-TYPE
    SYNTAX      NemoHaListEntry
    MAX-ACCESS   not-accessible
    STATUS      current
    DESCRIPTION
        "An entry containing additional information about a
        home agent that is offering NEMO service.
        "
    AUGMENTS { mip6HaListEntry }
    ::= { nemoHaListTable 1 }
```

```
NemoHaListEntry ::= SEQUENCE {
    nemoHaSupportsMr TruthValue
}
```

```
nemoHaSupportsMr OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS   read-only
    STATUS      current
    DESCRIPTION
```


"true(1) if the home agent supports mobile router and sent the home agent information with Mobile Router Flag.

false(0) implies that the home agent only supports mobile node.

"

REFERENCE

"[RFC 3963](#) : [Section 7.3](#)"

::= { nemoHaListEntry 1 }

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. 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 containing additional information contained in a Binding Update sent by a NEMO enabled mobile router to its home agent.

"

AUGMENTS {mip6MnBLEntry}

::= { nemoMrBLTable 1 }

NemoMrBLEntry ::= SEQUENCE {

nemoMrBLMode BITS,

nemoMrBLMrFlag TruthValue

}

nemoMrBLMode OBJECT-TYPE

SYNTAX BITS {

implicitMode (0),

explicitMode (1)


```
    }
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "This object indicates the mode of mobile router
        to tell the home agent to determine which prefixes
        belong to the mobile router.
        "
```

```
REFERENCE
    "RFC 3963 : Section 5.2"
::= { nemoMrBLEntry 1 }
```

```
nemoMrBLMrFlag OBJECT-TYPE
    SYNTAX TruthValue
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "true(1) if the mobile router sent the binding update
        with Mobile Router Flag that indicates to the home
        agent that the binding update is from a mobile router.
        false(0) implies that the mobile router is behaving
        as a mobile node.
        "
REFERENCE
    "RFC 3963 : Section 4.1, 5.1"
::= { nemoMrBLEntry 2 }
```

```
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 mobile router.
        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 BITS
}

nemoBindingMrFlag OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"true(1) if the home agent accepted the binding update with Mobile Router Flag from a mobile router.
false(0) implies that the binding cache is from a mobile node.

"

REFERENCE

"[RFC 3963](#) : [Section 6.1.1](#), 6.2"

::= { nemoBindingCacheEntry 1 }

nemoBindingMrMode OBJECT-TYPE

SYNTAX BITS {
 implicitMode(0),
 explicitMode(1)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"This object indicates the mode of mobile router to tell the home agent to determine which prefixes belong to the mobile router.

"

REFERENCE

"[RFC 3963](#) : [Section 5.2](#), 6.1.1, 6.2"

::= { nemoBindingCacheEntry 2 }

nemoHaPrefixTable OBJECT-TYPE

SYNTAX SEQUENCE OF NemoHaPrefixEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table contains the mobile network prefixes
that the home agent maintains for the Mobile Router.
"

REFERENCE

"[RFC 3963](#) : [Section 6.1](#)"

::= { nemoMrRegistration 2 }

nemoHaPrefixEntry OBJECT-TYPE

SYNTAX NemoHaPrefixEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This entry represents the mobile network prefixes
that are maintained by the home agent.
There are two method that the home agent studies
the mobile network prefixes.
In implicit mode, the mobile network prefixes is
configured by any method(ex. pre-defined) for
corresponding Mobile Router.
In explicit mode, the binding update from the mobile
router contains the mobile network prefix list.
The home agent maintains Prefix Table that contains
the home address of the mobile router for verifying
the prefix list from the mobile router.

This entry contains only the mobile network prefixes
that are registered by the corresponding binding
update. It does not include the prefixes studied
through the dynamic routing process between the home
agent and the mobile router.

The instances of the columnar objects in this entry
pertain to an interface for a particular value of
mip6BindingHomeAddressType, mip6BindingHomeAddress,
and nemoHaPrefixSeqNo.

The nemoHaPrefixSeqNo object is used to
distinguish between multiple instances of
the mobile network prefix on the same binding update
for the same set of
mip6BindingHomeAddressType, mip6BindingHomeAddress.
There is no upper-bound on the maximum number of
mobile network prefixes on a binding update but, for
practical purposes, the upper bound of the value
nemoHaPrefixSeqNo is set to 1024.

Implementers need to be aware that if the total

number of octets in mip6BindingHomeAddress exceeds 111, 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,
        nemoHaPrefixSeqNo
}
```

```
::= { nemoHaPrefixTable 1 }
```

```
NemoHaPrefixEntry ::= SEQUENCE {
    nemoHaPrefixSeqNo      Integer32,
    nemoHaPrefixType       InetAddressType,
    nemoHaPrefix           InetAddress,
    nemoHaPrefixLength     Unsigned32,
    nemoHaPrefixSource     BITS
}
```

nemoHaPrefixSeqNo OBJECT-TYPE

SYNTAX Integer32 (1..1024)

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The index that along with mip6BindingHomeAddressType, and mip6BindingHomeAddress uniquely identifies this row.

One binding update has some mobile network prefixes. So when we describe the prefix list corresponding to the binding cache, it will be needed as a sub index.

"

REFERENCE

"[RFC 3963](#) : [Section 6.1.1](#), 6.1.2"

```
::= { nemoHaPrefixEntry 1 }
```

nemoHaPrefixType OBJECT-TYPE

SYNTAX InetAddressType

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The address type for the mobile network prefix that follows.

"

REFERENCE

"[RFC 3963](#) : [Section 6.1](#), 6.2"

```
::= { nemoHaPrefixEntry 2 }
```


nemoHaPrefix 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 nemoHaPrefixType object.

"

REFERENCE

"[RFC 3963](#) : [Section 6.1](#), 6.2"

::= { nemoHaPrefixEntry 3 }

nemoHaPrefixLength OBJECT-TYPE

SYNTAX Unsigned32 (0..128)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The length of the prefix specified by the corresponding nemoHaPrefix Object.

"

REFERENCE

"[RFC 3963](#) : [Section 6.1](#), 6.2"

::= { nemoHaPrefixEntry 4 }

nemoHaPrefixSource OBJECT-TYPE

SYNTAX BITS{
 configured (0),
 bindingUpdate (1)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The information source of the mobile network prefix configured with the binding update.

Configured(1) represents that the information is introduced to the home agent without binding update. Binding Update(2) represents that the information is introduced to the home agent by the mobile network prefix option in the binding update and verified by the Prefix Table that the home agent maintains for each home addresses of the mobile router.

"

REFERENCE

"[RFC 3963](#) : [Section 6.1](#), 6.2"
 ::= { nemoHaPrefixEntry 5 }

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 Flag
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
mip6CounterDiscontinuityTime.

"

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 Flag is set to 1
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
mip6CounterDiscontinuityTime.

"

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 Flag is 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 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 mip6CounterDiscontinuityTime.

"

REFERENCE

"[RFC 3775](#) : [Section 10.5](#), 11.4.1, [RFC 3963](#): [Section 7.3](#)"
::= { nemoMrConf 3 }

--- nemoStats group

--

-- Dynamic Home Agent discovery protocol related counters

--

nemoDHAADRequests OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of dynamic home agent address discovery requests sent by the mobile router with the Mobile Router Support Flag (R) set.

"

REFERENCE

"[RFC3963](#) : [Section 7.1](#)."

::= { nemoHomeAgentDiscovery 1 }

nemoDHAADRepliesWNemoSupport OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of dynamic home agent address discovery replies sent by the home agent with Mobile Router Support Flag (R) set.

"

REFERENCE

"[RFC3963](#) : [Section 7.2](#)."

::= { nemoHomeAgentDiscovery 2 }

nemoDHAADRepliesWONemoSupport OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of dynamic home agent address
discovery replies sent by the home agent without
NEMO support i.e the Mobile Router Support Flag
set to 0.

"

REFERENCE

"[RFC3963](#) : [Section 7.2](#)."

::= { nemoHomeAgentDiscovery 3 }

nemoDHAADDiscoveryTimeouts OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of dynamic home agent address
discovery requests sent by the mobile router
with the Mobile Router Support Flag (R) set,
that did not receive any response.

"

::= { nemoHomeAgentDiscovery 4 }

--

-- nemoStats:nemoBindingRegcounters

--

nemoBindingAckswONemoSupport OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of Binding Acks without the
NEMO support received by the mobile router.

Discontinuities in the value of this counter can
occur at re-initialization of the mobile router.

"

REFERENCE

"[RFC3963](#) : [Section 5.3](#)."

::= { nemoBindingRegCounters 1 }

nemoBindingAckNotHomeRegn OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of Binding Update requests rejected by the home agent with the status code in the Binding Acknowledgment indicating 'Not Home Registration'

Discontinuities in the value of this counter can occur at re-initialization of the mobile router.

"

REFERENCE

"[RFC3963](#) : [Section 6.2](#)."

::= { nemoBindingRegCounters 2 }

nemoBindingRegTypeChanged 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 mobile router.

"

REFERENCE

"[RFC3963](#) : [Section 6.2](#)"

::= { nemoBindingRegCounters 3 }

nemoOpNotSupported 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 mobile router.

"

REFERENCE

"[RFC3963](#) : [Section 6.6](#)"

::= { nemoBindingRegCounters 4 }

nemoInvalidPrefix 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 mobile router.

"

REFERENCE

"[RFC3963](#) : [Section 6.6](#)."

::= { nemoBindingRegCounters 5 }

nemoNotAuthorizedForPrefix 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 mobile router.

"

REFERENCE

"[RFC3963](#) : [Section 6.6](#)."

::= { nemoBindingRegCounters 6 }

nemoForwardingSetupFailed 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 mobile router.

"

REFERENCE

"[RFC3963](#) : [Section 6.6](#)."

::= { nemoBindingRegCounters 7 }

--

-- nemoStats:nemoRoamingCounters

--

nemoMovedHome 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 mobile router.

"

::= { nemoRoamingCounters 1 }

nemoMovedOutOfHome 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 mobile router.

"

REFERENCE

"[RFC3963](#) : [Section 3](#)."

::= { nemoRoamingCounters 2 }

nemoMovedFNtoFN OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of times the mobile router has detected movement from to a foreign network from the home network, has reconstructed its 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 mobile router.

"

::= { nemoRoamingCounters 3 }

nemoBetterIfDetected OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Number of times the NEMO entity has found roaming interface with better priority.

Discontinuities in the value of this counter can occur at re-initialization of the mobile router.

"

::= { nemoRoamingCounters 4 }

--

--

-- nemoNotifications

--

--

nemoHomeTunnelEstablished NOTIFICATION-TYPE


```
OBJECTS    {
            nemoActiveRoamingIfIndex,
            nemoEstablishedHomeTunnelIfIndex,
            nemoRegCareofAddressType,
            nemoRegCareofAddress
          }
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
    "RFC3963 : Section 5.5"
    ::= { nemoNotifications 1 }
```

nemoHomeTunnelReleased NOTIFICATION-TYPE

```
OBJECTS    {
            nemoActiveRoamingIfIndex,
            nemoEstablishedHomeTunnelIfIndex,
            nemoRegCareofAddressType,
            nemoRegCareofAddress
          }
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
    "RFC3963 : Section 5.5"
    ::= { nemoNotifications 2 }
```

-- Conformance information

```
nemoGroups      OBJECT IDENTIFIER ::= { nemoConformance 1 }
nemoCompliances OBJECT IDENTIFIER ::= { nemoConformance 2 }
```

-- Units of conformance

```
nemoSystemGroup OBJECT-GROUP
  OBJECTS {
    nemoRoamingStatus,
    nemoRegisteredUpTime,
    nemoLastAcceptedRegTime,
    nemoLastRejectedRegTime,
```



```
        nemoTimeSinceLastRoamed,
        nemoRegHomeAgentAddressType,
        nemoRegHomeAgentAddress,
        nemoRegHomeAddressType,
        nemoRegHomeAddress,
        nemoRegHomeAddressPrefixLength,
        nemoRegCareofAddressType,
        nemoRegCareofAddress,
        nemoRegCareofAddressPrefixLength,
        nemoActiveRoamingIfIndex,
        nemoEstablishedHomeTunnelIfIndex
    }
    STATUS    current
    DESCRIPTION
        " A collection of objects for basic NEMO
          monitoring."
    ::= { nemoGroups 1 }
```

```
nemoConfigurationGroup    OBJECT-GROUP
    OBJECTS {
        nemoHomeRegLifeTime,
        nemoHomeRegRetryCount,
        nemoHomeRegRetryDelay,
        nemoHomeRegExtendBeforeExpiry,
        nemoDynamicHADiscovery,
        nemoHomeAddressIdentifierType,
        nemoHomeAddressIdentifierInetType,
        nemoHomeAddressIdentifier,
        nemoHomeIfIndex,
        nemoPrefixRegMode,
        nemoRegisterConnectedPrefixes,
        -- nemoHomeNetworkPrefixType,
        -- nemoHomeNetworkPrefix,
        -- nemoHomeNetworkPrefixLength,
        nemoHomeNetworkPrefixLifeTime,
        nemoPrefixLifeTime,
        -- nemoRoamingIfIndex,
        -- nemoRoamingIfPriority,
        nemoRoamingIfDescription,
        nemoRoamingIfRoamHoldDownTime,
        nemoDHAADRequests,
        nemoDHAADRepliesWNemoSupport,
        nemoDHAADRepliesWONemoSupport,
        nemoDHAADDiscoveryTimeouts,
        nemoHaSupportsMr,
        nemoMrBLMode,
        nemoMrBLMrFlag,
```



```
        nemoBindingMrFlag,
        nemoBindingMrMode,
        nemoHaPrefixType,
        nemoHaPrefix,
        nemoHaPrefixLength,
        nemoHaPrefixSource,
        nemoMrDiscoveryRequests,
        nemoMrDiscoveryReplies,
        nemoMrDiscoveryRepliesRouterFlagZero
    }
    STATUS    current
    DESCRIPTION
        " A collection of objects for basic NEMO
          configuration monitoring."
    ::= { nemoGroups 2 }
```

```
nemoStatsGroup      OBJECT-GROUP
    OBJECTS {
        nemoBindingAckswONemoSupport,
        nemoBindingAckNotHomeRegn,
        nemoBindingRegTypeChanged,
        nemoOpNotSupported,
        nemoInvalidPrefix,
        nemoNotAuthorizedForPrefix,
        nemoForwardingSetupFailed,
        nemoMovedHome,
        nemoMovedOutOfHome,
        nemoMovedFNtoFN,
        nemoBetterIfDetected
    }
    STATUS    current
    DESCRIPTION
        " A collection of objects for basic NEMO
          monitoring.
          "
    ::= { nemoGroups 3 }
```

```
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 4 }

-- Compliance statements
nemoCoreCompliance 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      nemoBindingHomeAddressType
        -- SYNTAX      InetAddressType { ipv6(2) }
        -- DESCRIPTION
        --   This MIB module requires support for global
        --   ipv6 addresses for the nemoBindingHomeAddress
        --   object.
        --
        "
    MODULE -- this module
        MANDATORY-GROUPS { nemoSystemGroup,
                           nemoConfigurationGroup,
                           nemoStatsGroup,
                           nemoNotificationGroup
                           }

 ::= { nemoCompliances 1 }

END
```

5. 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.

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 their sensitivity/vulnerability:

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

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

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

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

7. Acknowledgments

The authors would like to thank T.J Kniveton and Thierry Ernst for their review comments on this document.

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 IPv6q [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.

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.

[NEMOTERM] T. Ernst and H.-Y. Lach., Network Mobility Support Terminology, work in progress (currently [draft-ietf-nemo-terminology-06.txt](#)).

[NEMOGOAL] T. Ernst. Network Mobility Support Goals and Requirements, work in progress (currently [draft-ietf-nemo-requirements-06.txt](#)).

Authors' Addresses

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

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

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
Katahira Campus
Sendai,
Japan

Phone: +81-22-217-5454
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 (2007).

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 provided by the IETF Administrative Support Activity (IASA).

