Network Working Group Internet-Draft Obsoletes: <u>4008</u> (if approved) Intended status: Standards Track Expires: July 28, 2014 S. Perreault Viagenie T. Tsou Huawei Technologies (USA) S. Sivakumar Cisco Systems January 24, 2014

[Page 1]

Definitions of Managed Objects for Network Address Translators (NAT) draft-ietf-behave-nat-mib-11

Abstract

This memo defines a portion of the Management Information Base (MIB) for devices implementing Network Address Translator (NAT) function. This MIB module may be used for monitoring of a device capable of NAT function.

This document obsoletes <u>RFC 4008</u>.

Status of This Memo

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

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at http://datatracker.ietf.org/drafts/current/.

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."

This Internet-Draft will expire on July 28, 2014.

Copyright Notice

Copyright (c) 2014 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to <u>BCP 78</u> and the IETF Trust's Legal Provisions Relating to IETF Documents (<u>http://trustee.ietf.org/license-info</u>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect

Perreault, et al. Expires July 28, 2014

to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Simplified BSD License.

Table of Contents

$\underline{1}$. Introduction
2. The Internet-Standard Management Framework
<u>3</u> . Overview
<u>3.1</u> . Deprecated Features
<u>3.2</u> . New Features
<u>3.3</u> . Realms
$\underline{4}$. Definitions
5. Security Considerations
<u>6</u> . IANA Considerations
<u>7</u> . References
<u>7.1</u> . Normative References
7.2. Informative References
Authors' Addresses

<u>1</u>. Introduction

This memo defines a portion of the Management Information Base (MIB) for devices implementing NAT function. This MIB module may be used for monitoring of a device capable of NAT function. Using it for configuration is deprecated. NAT types and their characteristics are defined in [RFC2663]. Traditional NAT function, in particular is defined in [RFC3022]. This MIB does not address the firewall functions and must not be used for configuring or monitoring these. Section 2 provides references to the SNMP management framework, which was used as the basis for the MIB module definition. Section 3 provides an overview of the MIB features. Lastly, Section 4 has the complete NAT MIB definition.

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 [RFC2119].

2. The Internet-Standard Management Framework

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

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, <u>RFC 2578</u> [<u>RFC2578</u>], STD 58, <u>RFC 2579</u> [<u>RFC2579</u>] and STD 58, <u>RFC 2580</u> [<u>RFC2580</u>].

3. Overview

<u>3.1</u>. Deprecated Features

All objects defined in [<u>RFC4008</u>] have been marked with "STATUS deprecated" for the following reasons:

Writability: Experience with NAT has shown that implementations vary tremendously. The NAT algorithms and data structures have little in common across devices, and this results in wildly incompatible configuration parameters. Therefore, few implementations were ever able to claim full compliance.

Lesson learned: the MIB should be read-only as much as possible.

Exposing configuration parameters: Even in read-only mode, many configuration parameters were exposed by [<u>RFC4008</u>] (e.g. timeouts). Since implementations vary wildly in their sets of configuration parameters, few implementations could claim even basic compliance.

Lesson learned: the NAT MIB's purpose is not to expose configuration parameters.

Interfaces: Objects from [RFC4008] tie NAT state with interfaces
 (e.g. the interface table, the way map entries are grouped by
 interface). Many NAT implementations either never keep track of
 the interface or associate a mapping to a set of interfaces.
 Since interfaces are at the core of [RFC4008], many NAT devices
 were unable to have a proper implementation.

Lesson learned: NAT is a logical function that may be independent of interfaces. Do not tie NAT state with interfaces.

NAT service types: [RFC4008] used four categories of NAT service: basicNat, napt, bidirectionalNat, twiceNat. These are ill-defined and many implementations either use different categories or do not use categories at all.

Lesson learned: do not try to categorize NAT types.

Limited transport protocol set: The set of transport protocols was defined as: other, icmp, udp, tcp. Furthermore, the numeric values corresponding to those labels were arbitrary, without relation to the actual standard protocol numbers. This meant that NAT implementations were limited to those protocols and were unable to expose information about DCCP, SCTP, etc.

Lesson learned: use standard transport protocol numbers.

3.2. New Features

New features in this module are as follows:

- Counters: Many new counters are introduced. Most of them are available in two variants: global and per-transport protocol.
- Limits: A few limits on the quantity of state data stored by the NAT device. Some of them can trigger notifications.
- Address+Port Pools: Pools of external addresses and ports are often used in enterprise and ISP settings. Pools are listed in a table, each with its range of addresses and ports. It is possible to inspect each pool's usage, to set limits, and to receive notifications when thresholds are crossed.
- Address Mappings: NATs that have an "IP address pooling" behavior of "Paired" [<u>RFC4787</u>] maintain a mapping from internal address to external address. This module allows inspection of this mapping table.
- Mapping table indexed by external 3-tuple: It is often necessary to determine the internal address that is mapped to a given external address and port. This MIB provides this table with an index to accomplish this efficiently, without having to iterate over all mappings.

Realms: See <u>Section 3.3</u>.

- <u>RFC 4787</u> terminology: Mapping table entries indicate the mapping behavior, the filtering behavior, and the address pooling behavior that were used to create the mapping.
- Subscriber awareness: With the advent of CGN deployment, a set of subscriber specific counters, limits and parameters are added.

NAT instances: Multiple NAT instances may be managed by a single SNMP agent. All instance-specific objects (counters, limits, etc.) are indexed by NAT instance ID. In addition, NAT instances may be reliably identified using the natInstanceAlias object.

3.3. Realms

Current NAT devices commonly allow the internal and external parts of a mapping to come from different realms. The meaning of "realm" is implementation-dependent. On some implementations it can be equivalent to the name of a VPN Routing and Forwarding table (VRF). On others it is simply the numeric index of a virtual routing table. Note that this usage of "realm" is completely different from the one in [<u>RFC4008</u>].

This MIB allows the realm to be indicated where it makes sense. The format is an SnmpAdminString. On platforms that identify realms with integers, the string representation of the integer is used instead. The empty string has special meaning: it refers to the default realm.

Note that many MIBs implicitly support realms in one form or another by using SNMPv3 contexts. See for example the OSPFv2 MIB [RFC4750]. This method cannot be used for the NAT MIB because mapppings can belong to two realms simultaneously: the internal part can be in one realm while the external part is in another. In such cases the NAT function acts like a "wormhole" between two realms. Using contexts would implicitly impose the restriction that all objects would have to belong to the same realm.

4. Definitions

This MIB module IMPORTs objects from [<u>RFC2578</u>], [<u>RFC2579</u>], and [<u>RFC4001</u>].

NAT-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, Integer32, Unsigned32, Gauge32, Counter64, TimeTicks, mib-2, NOTIFICATION-TYPE FROM SNMPv2-SMI TEXTUAL-CONVENTION,

Internet-Draft

DisplayString, StorageType, RowStatus FROM SNMPv2-TC MODULE-COMPLIANCE, NOTIFICATION-GROUP, **OBJECT-GROUP** FROM SNMPv2-CONF ifIndex, ifCounterDiscontinuityGroup, InterfaceIndex FROM IF-MIB SnmpAdminString FROM SNMP-FRAMEWORK-MIB InetAddressType, InetAddress, InetAddressPrefixLength, InetPortNumber FROM INET-ADDRESS-MIB VPNId0rZero FROM VPN-TC-STD-MIB; natMIB MODULE-IDENTITY LAST-UPDATED "201304260000Z" -- RFC Ed.: set to publication date ORGANIZATION "IETF Behavior Engineering for Hindrance Avoidance (BEHAVE) Working Group" CONTACT-INFO "Working Group Email: behave@ietf.org Simon Perreault Viagenie 246 Aberdeen Quebec, QC G1R 2E1 Canada Phone: +1 418 656 9254 Email: simon.perreault@viagenie.ca URI: <u>http://viagenie.ca</u> Tina Tsou Huawei Technologies (USA) 2330 Central Expressway Santa Clara, CA 95050 USA

Perreault, et al. Expires July 28, 2014 [Page 6]

Phone: +1 408 330 4424 Email: tina.tsou.zouting@huawei.com Senthil Sivakumar Cisco Systems 7100-8 Kit Creek Road Research Triangle Park, North Carolina 27709 USA Phone: +1 919 392 5158 Email: ssenthil@cisco.com" DESCRIPTION "This MIB module defines the generic managed objects for NAT. Copyright (C) The Internet Society (2013). This version of this MIB module is part of RFC yyyy; see the RFC itself for full legal notices." -- RFC Ed.: replace yyyy with actual RFC number & remove this note" "201304260000Z" REVISION -- RFC Ed.: set to publication date DESCRIPTION "Complete rewrite, published as RFC yyyy." -- RFC Ed.: replace yyyy with actual RFC number & set date" REVISION "200503210000Z" -- 21th March 2005 DESCRIPTION "Initial version, published as RFC 4008." ::= { mib-2 123 } natMIBObjects OBJECT IDENTIFIER ::= { natMIB 1 } NatProtocolType ::= TEXTUAL-CONVENTION STATUS deprecated DESCRIPTION "A list of protocols that support the network address translation. Inclusion of the values is not intended to imply that those protocols need to be supported. Any change in this TEXTUAL-CONVENTION should also be reflected in the definition of NatProtocolMap, which is a BITS representation of this." SYNTAX INTEGER { none (1), -- not specified other (2), -- none of the following icmp (3), udp (4), tcp (5)

Perreault, et al. Expires July 28, 2014 [Page 7]

```
}
NatProtocolMap ::= TEXTUAL-CONVENTION
      STATUS
                   deprecated
      DESCRIPTION
               "A bitmap of protocol identifiers that support
                the network address translation. Any change
                in this TEXTUAL-CONVENTION should also be
                reflected in the definition of NatProtocolType."
      SYNTAX
               BITS {
                 other (0),
                 icmp (1),
                 udp (2),
                 tcp (3)
                }
NatAddrMapId ::= TEXTUAL-CONVENTION
      DISPLAY-HINT "d"
      STATUS deprecated
      DESCRIPTION
               "A unique id that is assigned to each address map
                by a NAT enabled device."
      SYNTAX Unsigned32 (1..4294967295)
NatBindIdOrZero ::= TEXTUAL-CONVENTION
      DISPLAY-HINT "d"
      STATUS deprecated
      DESCRIPTION
               "A unique id that is assigned to each bind by
                a NAT enabled device. The bind id will be zero
                in the case of a Symmetric NAT."
      SYNTAX Unsigned32 (0..4294967295)
NatBindId ::= TEXTUAL-CONVENTION
      DISPLAY-HINT "d"
      STATUS deprecated
      DESCRIPTION
               "A unique id that is assigned to each bind by
                a NAT enabled device."
      SYNTAX Unsigned32 (1..4294967295)
NatSessionId ::= TEXTUAL-CONVENTION
      DISPLAY-HINT "d"
      STATUS deprecated
      DESCRIPTION
              "A unique id that is assigned to each session by
                a NAT enabled device."
      SYNTAX Unsigned32 (1..4294967295)
```

Perreault, et al. Expires July 28, 2014 [Page 8]

Internet-Draft

```
NAT MIB
```

```
NatBindMode ::= TEXTUAL-CONVENTION
       STATUS deprecated
       DESCRIPTION
               "An indication of whether the bind is
                an address bind or an address port bind."
                INTEGER {
       SYNTAX
                     addressBind (1),
                     addressPortBind (2)
                }
NatAssociationType ::= TEXTUAL-CONVENTION
       STATUS deprecated
       DESCRIPTION
               "An indication of whether the association is
                static or dynamic."
                INTEGER {
       SYNTAX
                     static (1),
                     dynamic (2)
                }
NatTranslationEntity ::= TEXTUAL-CONVENTION
       STATUS
                    deprecated
       DESCRIPTION
               "An indication of a) the direction of a session for
                which an address map entry, address bind or port
                bind is applicable, and b) the entity (source or
                destination) within the session that is subject to
                translation."
       SYNTAX
                BITS {
                  inboundSrcEndPoint (0),
                  outboundDstEndPoint(1),
                  inboundDstEndPoint (2),
                  outboundSrcEndPoint(3)
                }
- -
-- Default Values for the Bind and NAT Protocol Timers
natDefTimeouts OBJECT IDENTIFIER ::= { natMIBObjects 1 }
natNotifCtrl OBJECT IDENTIFIER ::= { natMIBObjects 2 }
- -
-- Address Bind and Port Bind related NAT configuration
- -
```

```
natBindDefIdleTimeout OBJECT-TYPE
   SYNTAX
               Unsigned32 (0..4294967295)
               "seconds"
   UNITS
   MAX-ACCESS read-write
   STATUS
               deprecated
   DESCRIPTION
            "The default Bind (Address Bind or Port Bind) idle
             timeout parameter.
             If the agent is capable of storing non-volatile
             configuration, then the value of this object must be
             restored after a re-initialization of the management
             system."
   DEFVAL { 0 }
    ::= { natDefTimeouts 1 }
- -
-- UDP related NAT configuration
- -
natUdpDefIdleTimeout OBJECT-TYPE
   SYNTAX
               Unsigned32 (1..4294967295)
               "seconds"
   UNITS
   MAX-ACCESS read-write
   STATUS
              deprecated
   DESCRIPTION
            "The default UDP idle timeout parameter.
             If the agent is capable of storing non-volatile
             configuration, then the value of this object must be
             restored after a re-initialization of the management
             system."
   DEFVAL { 300 }
    ::= { natDefTimeouts 2 }
- -
-- ICMP related NAT configuration
- -
natIcmpDefIdleTimeout OBJECT-TYPE
   SYNTAX
              Unsigned32 (1..4294967295)
               "seconds"
   UNITS
   MAX-ACCESS read-write
   STATUS
               deprecated
   DESCRIPTION
            "The default ICMP idle timeout parameter.
             If the agent is capable of storing non-volatile
```

```
configuration, then the value of this object must be
             restored after a re-initialization of the management
             system."
   DEFVAL { 300 }
    ::= { natDefTimeouts 3 }
- -
-- Other protocol parameters
- -
natOtherDefIdleTimeout OBJECT-TYPE
    SYNTAX
               Unsigned32 (1..4294967295)
               "seconds"
   UNITS
   MAX-ACCESS read-write
   STATUS
              deprecated
   DESCRIPTION
            "The default idle timeout parameter for protocols
             represented by the value other (2) in
             NatProtocolType.
             If the agent is capable of storing non-volatile
             configuration, then the value of this object must be
             restored after a re-initialization of the management
             system."
   DEFVAL \{ 60 \}
    ::= { natDefTimeouts 4 }
- -
-- TCP related NAT Timers
- -
natTcpDefIdleTimeout OBJECT-TYPE
              Unsigned32 (1..4294967295)
   SYNTAX
   UNITS
               "seconds"
   MAX-ACCESS read-write
   STATUS
               deprecated
   DESCRIPTION
            "The default time interval that a NAT session for an
             established TCP connection is allowed to remain
             valid without any activity on the TCP connection.
             If the agent is capable of storing non-volatile
             configuration, then the value of this object must be
             restored after a re-initialization of the management
             system."
   DEFVAL { 86400 }
    ::= { natDefTimeouts 5 }
```

```
natTcpDefNegTimeout OBJECT-TYPE
   SYNTAX
               Unsigned32 (1..4294967295)
   UNTTS
               "seconds"
   MAX-ACCESS read-write
   STATUS
             deprecated
   DESCRIPTION
            "The default time interval that a NAT session for a TCP
             connection that is not in the established state
             is allowed to remain valid without any activity on
             the TCP connection.
             If the agent is capable of storing non-volatile
             configuration, then the value of this object must be
             restored after a re-initialization of the management
             system."
   DEFVAL \{ 60 \}
    ::= { natDefTimeouts 6 }
natNotifThrottlingInterval OBJECT-TYPE
   SYNTAX
               Integer32 (0 | 5..3600)
                "seconds"
   UNITS
   MAX-ACCESS read-write
   STATUS
                deprecated
   DESCRIPTION
            "This object controls the generation of the
             natPacketDiscard notification.
             If this object has a value of zero, then no
             natPacketDiscard notifications will be transmitted by
             the agent.
             If this object has a non-zero value, then the agent must
             not generate more than one natPacketDiscard
             'notification-event' in the indicated period, where a
             'notification-event' is the generation of a single
             notification PDU type to a list of notification
             destinations. If additional NAT packets are discarded
             within the throttling period, then notification-events
             for these changes must be suppressed by the agent until
             the current throttling period expires.
             If natNotifThrottlingInterval notification generation
             is enabled, the suggested default throttling period is
             60 seconds, but generation of the natPacketDiscard
             notification should be disabled by default.
             If the agent is capable of storing non-volatile
             configuration, then the value of this object must be
```

Perreault, et al. Expires July 28, 2014 [Page 12]

```
restored after a re-initialization of the management
             system.
             The actual transmission of notifications is controlled
             via the MIB modules in RFC 3413."
   DEFVAL { 0 }
    ::= { natNotifCtrl 1 }
-- The NAT Interface Table
natInterfaceTable OBJECT-TYPE
   SYNTAX
               SEQUENCE OF NatInterfaceEntry
   MAX-ACCESS not-accessible
   STATUS
                deprecated
   DESCRIPTION
            "This table specifies the attributes for interfaces on a
             device supporting NAT function."
    ::= { natMIBObjects 3 }
natInterfaceEntry OBJECT-TYPE
   SYNTAX
               NatInterfaceEntry
   MAX-ACCESS not-accessible
   STATUS
               deprecated
   DESCRIPTION
            "Each entry in the natInterfaceTable holds a set of
             parameters for an interface, instantiated by
             ifIndex. Therefore, the interface index must have been
             assigned, according to the applicable procedures,
             before it can be meaningfully used.
             Generally, this means that the interface must exist.
             When natStorageType is of type nonVolatile, however,
             this may reflect the configuration for an interface
             whose ifIndex has been assigned but for which the
             supporting implementation is not currently present."
    INDEX
            { ifIndex }
    ::= { natInterfaceTable 1 }
NatInterfaceEntry ::= SEQUENCE {
   natInterfaceRealm
                                 INTEGER,
   natInterfaceServiceType
                                 BITS,
   natInterfaceInTranslates
                                 Counter64,
    natInterfaceOutTranslates
                                Counter64,
   natInterfaceDiscards
                                Counter64,
   natInterfaceStorageType
                                 StorageType,
```

```
natInterfaceRowStatus
                                 RowStatus
}
natInterfaceRealm OBJECT-TYPE
    SYNTAX
               INTEGER {
                   private (1),
                   public (2)
               }
    MAX-ACCESS read-create
    STATUS
               deprecated
    DESCRIPTION
            "This object identifies whether this interface is
             connected to the private or the public realm."
    DEFVAL { public }
    ::= { natInterfaceEntry 1 }
natInterfaceServiceType OBJECT-TYPE
    SYNTAX BITS {
                basicNat (0),
                napt (1),
                bidirectionalNat (2),
                twiceNat (3)
            }
    MAX-ACCESS read-create
    STATUS
                deprecated
    DESCRIPTION
            "An indication of the direction in which new sessions
             are permitted and the extent of translation done within
             the IP and transport headers."
    ::= { natInterfaceEntry 2 }
natInterfaceInTranslates OBJECT-TYPE
    SYNTAX
              Counter64
    MAX-ACCESS read-only
    STATUS
               deprecated
    DESCRIPTION
            "Number of packets received on this interface that
             were translated.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natInterfaceEntry 3 }
natInterfaceOutTranslates OBJECT-TYPE
    SYNTAX
              Counter64
    MAX-ACCESS read-only
               deprecated
    STATUS
```

Perreault, et al. Expires July 28, 2014 [Page 14]

```
DESCRIPTION
            "Number of translated packets that were sent out this
             interface.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natInterfaceEntry 4 }
natInterfaceDiscards OBJECT-TYPE
   SYNTAX
              Counter64
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "Number of packets that had to be rejected/dropped due to
             a lack of resources for this interface.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
     ::= { natInterfaceEntry 5 }
natInterfaceStorageType OBJECT-TYPE
   SYNTAX
                StorageType
   MAX-ACCESS read-create
                deprecated
    STATUS
   DESCRIPTION
            "The storage type for this conceptual row.
            Conceptual rows having the value 'permanent'
             need not allow write-access to any columnar objects
             in the row."
   REFERENCE
            "Textual Conventions for SMIv2, Section 2."
    DEFVAL { nonVolatile }
    ::= { natInterfaceEntry 6 }
natInterfaceRowStatus OBJECT-TYPE
   SYNTAX
               RowStatus
   MAX-ACCESS read-create
               deprecated
   STATUS
   DESCRIPTION
            "The status of this conceptual row.
             Until instances of all corresponding columns are
             appropriately configured, the value of the
             corresponding instance of the natInterfaceRowStatus
```

Perreault, et al. Expires July 28, 2014 [Page 15]

```
column is 'notReady'.
             In particular, a newly created row cannot be made
             active until the corresponding instance of
             natInterfaceServiceType has been set.
             None of the objects in this row may be modified
             while the value of this object is active(1)."
   REFERENCE
            "Textual Conventions for SMIv2, Section 2."
    ::= { natInterfaceEntry 7 }
- -
-- The Address Map Table
- -
natAddrMapTable OBJECT-TYPE
   SYNTAX
                SEQUENCE OF NatAddrMapEntry
   MAX-ACCESS not-accessible
                deprecated
   STATUS
   DESCRIPTION
            "This table lists address map parameters for NAT."
    ::= { natMIBObjects 4 }
natAddrMapEntry OBJECT-TYPE
   SYNTAX
                NatAddrMapEntry
   MAX-ACCESS not-accessible
                deprecated
   STATUS
   DESCRIPTION
            "This entry represents an address map to be used for
             NAT and contributes to the dynamic and/or static
             address mapping tables of the NAT device."
            { ifIndex, natAddrMapIndex }
    INDEX
    ::= { natAddrMapTable 1 }
NatAddrMapEntry ::= SEQUENCE {
    natAddrMapIndex
                                    NatAddrMapId,
   natAddrMapName
                                    SnmpAdminString,
   natAddrMapEntryType
                                    NatAssociationType,
   natAddrMapTranslationEntity
                                    NatTranslationEntity,
   natAddrMapLocalAddrType
                                    InetAddressType,
   natAddrMapLocalAddrFrom
                                    InetAddress,
   natAddrMapLocalAddrTo
                                    InetAddress,
   natAddrMapLocalPortFrom
                                    InetPortNumber,
   natAddrMapLocalPortTo
                                    InetPortNumber,
   natAddrMapGlobalAddrType
                                    InetAddressType,
    natAddrMapGlobalAddrFrom
                                    InetAddress,
```

```
natAddrMapGlobalAddrTo
                                    InetAddress,
   natAddrMapGlobalPortFrom
                                    InetPortNumber,
   natAddrMapGlobalPortTo
                                    InetPortNumber,
   natAddrMapProtocol
                                    NatProtocolMap,
   natAddrMapInTranslates
                                    Counter64,
   natAddrMapOutTranslates
                                    Counter64,
   natAddrMapDiscards
                                    Counter64,
   natAddrMapAddrUsed
                                    Gauge32,
   natAddrMapStorageType
                                    StorageType,
   natAddrMapRowStatus
                                    RowStatus
}
natAddrMapIndex OBJECT-TYPE
   SYNTAX
                NatAddrMapId
   MAX-ACCESS not-accessible
                deprecated
   STATUS
   DESCRIPTION
            "Along with ifIndex, this object uniquely
             identifies an entry in the natAddrMapTable.
             Address map entries are applied in the order
             specified by natAddrMapIndex."
    ::= { natAddrMapEntry 1 }
natAddrMapName OBJECT-TYPE
   SYNTAX
                SnmpAdminString (SIZE(1..32))
   MAX-ACCESS read-create
   STATUS
                deprecated
   DESCRIPTION
            "Name identifying all map entries in the table associated
             with the same interface. All map entries with the same
             ifIndex MUST have the same map name."
    ::= { natAddrMapEntry 2 }
natAddrMapEntryType OBJECT-TYPE
   SYNTAX
                NatAssociationType
   MAX-ACCESS read-create
   STATUS
                deprecated
   DESCRIPTION
            "This parameter can be used to set up static
             or dynamic address maps."
    ::= { natAddrMapEntry 3 }
natAddrMapTranslationEntity OBJECT-TYPE
   SYNTAX
                NatTranslationEntity
   MAX-ACCESS read-create
   STATUS
               deprecated
   DESCRIPTION
            "The end-point entity (source or destination) in
```

Perreault, et al. Expires July 28, 2014 [Page 17]

inbound or outbound sessions (i.e., first packets) that may be translated by an address map entry.

Session direction (inbound or outbound) is derived from the direction of the first packet of a session traversing a NAT interface. NAT address (and Transport-ID) maps may be defined to effect inbound or outbound sessions.

Traditionally, address maps for Basic NAT and NAPT are configured on a public interface for outbound sessions, effecting translation of source end-point. The value of this object must be set to outboundSrcEndPoint for those interfaces.

Alternately, if address maps for Basic NAT and NAPT were to be configured on a private interface, the desired value for this object for the map entries would be inboundSrcEndPoint (i.e., effecting translation of source end-point for inbound sessions).

If TwiceNAT were to be configured on a private interface, the desired value for this object for the map entries would be a bitmask of inboundSrcEndPoint and inboundDstEndPoint."

```
::= { natAddrMapEntry 4 }
```

```
natAddrMapLocalAddrType OBJECT-TYPE
```

SYNTAX InetAddressType MAX-ACCESS read-create STATUS deprecated DESCRIPTION "This object specifies the address type used for natAddrMapLocalAddrFrom and natAddrMapLocalAddrTo."

```
::= { natAddrMapEntry 5 }
```

```
natAddrMapLocalAddrFrom OBJECT-TYPE
```

SYNTAX InetAddress MAX-ACCESS read-create STATUS deprecated DESCRIPTION

This object sr

"This object specifies the first IP address of the range of IP addresses mapped by this translation entry. The value of this object must be less than or equal to the value of the natAddrMapLocalAddrTo object.

The type of this address is determined by the value of the natAddrMapLocalAddrType object."

```
::= { natAddrMapEntry 6 }
natAddrMapLocalAddrTo OBJECT-TYPE
   SYNTAX
               InetAddress
   MAX-ACCESS read-create
   STATUS
               deprecated
   DESCRIPTION
            "This object specifies the last IP address of the range
             of IP addresses mapped by this translation entry. If
             only a single address is being mapped, the value of this
             object is equal to the value of natAddrMapLocalAddrFrom.
             For a static NAT, the number of addresses in the range
             defined by natAddrMapLocalAddrFrom and
             natAddrMapLocalAddrTo must be equal to the number of
             addresses in the range defined by
             natAddrMapGlobalAddrFrom and natAddrMapGlobalAddrTo.
             The value of this object must be greater than or equal
             to the value of the natAddrMapLocalAddrFrom object.
             The type of this address is determined by the value of
             the natAddrMapLocalAddrType object."
    ::= { natAddrMapEntry 7 }
natAddrMapLocalPortFrom OBJECT-TYPE
    SYNTAX
               InetPortNumber
   MAX-ACCESS read-create
   STATUS
               deprecated
    DESCRIPTION
            "If this conceptual row describes a Basic NAT address
             mapping, then the value of this object must be zero.
                                                                   If
             this conceptual row describes NAPT, then the value of
             this object specifies the first port number in the range
             of ports being mapped.
             The value of this object must be less than or equal to
             the value of the natAddrMapLocalPortTo object. If the
             translation specifies a single port, then the value of
             this object is equal to the value of
             natAddrMapLocalPortTo."
   DEFVAL { 0 }
    ::= { natAddrMapEntry 8 }
natAddrMapLocalPortTo OBJECT-TYPE
   SYNTAX
               InetPortNumber
   MAX-ACCESS read-create
   STATUS
               deprecated
    DESCRIPTION
            "If this conceptual row describes a Basic NAT address
```
Perreault, et al. Expires July 28, 2014 [Page 19]

```
mapping, then the value of this object must be zero. If
             this conceptual row describes NAPT, then the value of
             this object specifies the last port number in the range
             of ports being mapped.
             The value of this object must be greater than or equal
             to the value of the natAddrMapLocalPortFrom object. If
             the translation specifies a single port, then the value
             of this object is equal to the value of
             natAddrMapLocalPortFrom."
   DEFVAL { 0 }
    ::= { natAddrMapEntry 9 }
natAddrMapGlobalAddrType OBJECT-TYPE
   SYNTAX
               InetAddressType
   MAX-ACCESS read-create
   STATUS
               deprecated
   DESCRIPTION
            "This object specifies the address type used for
             natAddrMapGlobalAddrFrom and natAddrMapGlobalAddrTo."
    ::= { natAddrMapEntry 10 }
natAddrMapGlobalAddrFrom OBJECT-TYPE
   SYNTAX
               InetAddress
   MAX-ACCESS read-create
   STATUS
                deprecated
   DESCRIPTION
            "This object specifies the first IP address of the range
             of IP addresses being mapped to. The value of this
             object must be less than or equal to the value of the
             natAddrMapGlobalAddrTo object.
             The type of this address is determined by the value of
             the natAddrMapGlobalAddrType object."
    ::= { natAddrMapEntry 11 }
natAddrMapGlobalAddrTo OBJECT-TYPE
   SYNTAX
                InetAddress
   MAX-ACCESS read-create
   STATUS
                deprecated
    DESCRIPTION
            "This object specifies the last IP address of the range
             of IP addresses being mapped to. If only a single
             address is being mapped to, the value of this object is
             equal to the value of natAddrMapGlobalAddrFrom. For a
             static NAT, the number of addresses in the range defined
             by natAddrMapGlobalAddrFrom and natAddrMapGlobalAddrTo
             must be equal to the number of addresses in the range
```

Perreault, et al. Expires July 28, 2014 [Page 20]

```
defined by natAddrMapLocalAddrFrom and
             natAddrMapLocalAddrTo. The value of this object must be
             greater than or equal to the value of the
             natAddrMapGlobalAddrFrom object.
             The type of this address is determined by the value of
             the natAddrMapGlobalAddrType object."
    ::= { natAddrMapEntry 12 }
natAddrMapGlobalPortFrom OBJECT-TYPE
   SYNTAX
               InetPortNumber
   MAX-ACCESS read-create
   STATUS
               deprecated
    DESCRIPTION
            "If this conceptual row describes a Basic NAT address
             mapping, then the value of this object must be zero.
                                                                   If
             this conceptual row describes NAPT, then the value of
             this object specifies the first port number in the range
             of ports being mapped to.
             The value of this object must be less than or equal to
             the value of the natAddrMapGlobalPortTo object. If the
             translation specifies a single port, then the value of
             this object is equal to the value
             natAddrMapGlobalPortTo."
   DEFVAL { 0 }
    ::= { natAddrMapEntry 13 }
natAddrMapGlobalPortTo OBJECT-TYPE
   SYNTAX
               InetPortNumber
   MAX-ACCESS read-create
   STATUS
                deprecated
    DESCRIPTION
            "If this conceptual row describes a Basic NAT address
             mapping, then the value of this object must be zero.
                                                                   If
             this conceptual row describes NAPT, then the value of
             this object specifies the last port number in the range
             of ports being mapped to.
             The value of this object must be greater than or equal
             to the value of the natAddrMapGlobalPortFrom object. If
             the translation specifies a single port, then the value
             of this object is equal to the value of
             natAddrMapGlobalPortFrom."
   DEFVAL { 0 }
    ::= { natAddrMapEntry 14 }
```

```
natAddrMapProtocol OBJECT-TYPE
   SYNTAX
               NatProtocolMap
   MAX-ACCESS read-create
   STATUS
                deprecated
   DESCRIPTION
            "This object specifies a bitmap of protocol identifiers."
    ::= { natAddrMapEntry 15 }
natAddrMapInTranslates OBJECT-TYPE
   SYNTAX
               Counter64
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "The number of inbound packets pertaining to this address
             map entry that were translated.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times, as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natAddrMapEntry 16 }
natAddrMapOutTranslates OBJECT-TYPE
   SYNTAX
              Counter64
   MAX-ACCESS read-only
   STATUS
               deprecated
   DESCRIPTION
            "The number of outbound packets pertaining to this
             address map entry that were translated.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times, as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natAddrMapEntry 17 }
natAddrMapDiscards OBJECT-TYPE
   SYNTAX
               Counter64
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "The number of packets pertaining to this address map
             entry that were dropped due to lack of addresses in the
             address pool identified by this address map. The value
             of this object must always be zero in case of static
             address map.
             Discontinuities in the value of this counter can occur
```

Perreault, et al. Expires July 28, 2014 [Page 22]

```
at reinitialization of the management system and at
             other times, as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natAddrMapEntry 18 }
natAddrMapAddrUsed OBJECT-TYPE
   SYNTAX
             Gauge32
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "The number of addresses pertaining to this address map
             that are currently being used from the NAT pool.
             The value of this object must always be zero in the case
             of a static address map."
    ::= { natAddrMapEntry 19 }
natAddrMapStorageType OBJECT-TYPE
   SYNTAX
                StorageType
   MAX-ACCESS read-create
   STATUS
                deprecated
   DESCRIPTION
            "The storage type for this conceptual row.
             Conceptual rows having the value 'permanent'
             need not allow write-access to any columnar objects
             in the row."
   REFERENCE
            "Textual Conventions for SMIv2, Section 2."
    DEFVAL { nonVolatile }
    ::= { natAddrMapEntry 20 }
natAddrMapRowStatus OBJECT-TYPE
   SYNTAX
                RowStatus
   MAX-ACCESS read-create
   STATUS
                deprecated
    DESCRIPTION
            "The status of this conceptual row.
             Until instances of all corresponding columns are
             appropriately configured, the value of the
             corresponding instance of the natAddrMapRowStatus
             column is 'notReady'.
             None of the objects in this row may be modified
             while the value of this object is active(1)."
    REFERENCE
            "Textual Conventions for SMIv2, Section 2."
    ::= { natAddrMapEntry 21 }
```

Perreault, et al. Expires July 28, 2014 [Page 23]

```
NAT MIB
```

```
- -
-- Address Bind section
- -
natAddrBindNumberOfEntries OBJECT-TYPE
    SYNTAX
              Gauge32
   MAX-ACCESS read-only
    STATUS
             deprecated
    DESCRIPTION
            "This object maintains a count of the number of entries
             that currently exist in the natAddrBindTable."
    ::= { natMIBObjects 5 }
-- The NAT Address BIND Table
- -
natAddrBindTable OBJECT-TYPE
    SYNTAX SEQUENCE OF NatAddrBindEntry
    MAX-ACCESS not-accessible
    STATUS
             deprecated
    DESCRIPTION
            "This table holds information about the currently
            active NAT BINDs."
    ::= { natMIBObjects 6 }
natAddrBindEntry OBJECT-TYPE
    SYNTAX
             NatAddrBindEntry
    MAX-ACCESS not-accessible
    STATUS
              deprecated
    DESCRIPTION
            "Each entry in this table holds information about
             an active address BIND. These entries are lost
             upon agent restart.
             This row has indexing which may create variables with
             more than 128 subidentifiers. Implementers of this
             table must be careful not to create entries that would
             result in OIDs which exceed the 128 subidentifier limit.
             Otherwise, the information cannot be accessed using
             SNMPv1, SNMPv2c or SNMPv3."
    INDEX { ifIndex,
             natAddrBindLocalAddrType,
              natAddrBindLocalAddr }
    ::= { natAddrBindTable 1 }
NatAddrBindEntry ::= SEQUENCE {
```

```
natAddrBindLocalAddrType
                                    InetAddressType,
   natAddrBindLocalAddr
                                    InetAddress,
   natAddrBindGlobalAddrType
                                    InetAddressType,
   natAddrBindGlobalAddr
                                    InetAddress,
   natAddrBindId
                                    NatBindId,
   natAddrBindTranslationEntity
                                    NatTranslationEntity,
   natAddrBindType
                                    NatAssociationType,
   natAddrBindMapIndex
                                    NatAddrMapId,
   natAddrBindSessions
                                    Gauge32,
   natAddrBindMaxIdleTime
                                    TimeTicks,
    natAddrBindCurrentIdleTime
                                    TimeTicks,
   natAddrBindInTranslates
                                    Counter64,
    natAddrBindOutTranslates
                                    Counter64
}
natAddrBindLocalAddrType OBJECT-TYPE
   SYNTAX
                InetAddressType
   MAX-ACCESS not-accessible
   STATUS
               deprecated
    DESCRIPTION
            "This object specifies the address type used for
             natAddrBindLocalAddr."
    ::= { natAddrBindEntry 1 }
natAddrBindLocalAddr OBJECT-TYPE
   SYNTAX
             InetAddress (SIZE (4|16))
   MAX-ACCESS not-accessible
   STATUS
             deprecated
   DESCRIPTION
            "This object represents the private-realm specific
             network layer address, which maps to the public-realm
             address represented by natAddrBindGlobalAddr.
             The type of this address is determined by the value of
             the natAddrBindLocalAddrType object."
   ::= { natAddrBindEntry 2 }
natAddrBindGlobalAddrType OBJECT-TYPE
    SYNTAX
                InetAddressType
   MAX-ACCESS read-only
   STATUS
                deprecated
   DESCRIPTION
            "This object specifies the address type used for
             natAddrBindGlobalAddr."
    ::= { natAddrBindEntry 3 }
natAddrBindGlobalAddr OBJECT-TYPE
```

```
SYNTAX InetAddress
```

Perreault, et al. Expires July 28, 2014 [Page 25]

```
MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "This object represents the public-realm network layer
             address that maps to the private-realm network layer
             address represented by natAddrBindLocalAddr.
             The type of this address is determined by the value of
             the natAddrBindGlobalAddrType object."
    ::= { natAddrBindEntry 4 }
natAddrBindId OBJECT-TYPE
    SYNTAX
             NatBindId
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "This object represents a bind id that is dynamically
             assigned to each bind by a NAT enabled device. Each
             bind is represented by a bind id that is
             unique across both, the natAddrBindTable and the
             natAddrPortBindTable."
    ::= { natAddrBindEntry 5 }
natAddrBindTranslationEntity OBJECT-TYPE
    SYNTAX
               NatTranslationEntity
   MAX-ACCESS read-only
   STATUS
             deprecated
   DESCRIPTION
            "This object represents the direction of sessions
             for which this bind is applicable and the endpoint
             entity (source or destination) within the sessions that
             is subject to translation using the BIND.
             Orientation of the bind can be a superset of
             translationEntity of the address map entry which
             forms the basis for this bind.
             For example, if the translationEntity of an
             address map entry is outboundSrcEndPoint, the
             translationEntity of a bind derived from this
             map entry may either be outboundSrcEndPoint or
             it may be bidirectional (a bitmask of
             outboundSrcEndPoint and inboundDstEndPoint)."
    ::= { natAddrBindEntry 6 }
natAddrBindType OBJECT-TYPE
    SYNTAX
               NatAssociationType
   MAX-ACCESS read-only
```

Perreault, et al. Expires July 28, 2014 [Page 26]

```
deprecated
    STATUS
    DESCRIPTION
            "This object indicates whether the bind is static or
             dynamic."
    ::= { natAddrBindEntry 7 }
natAddrBindMapIndex OBJECT-TYPE
    SYNTAX
               NatAddrMapId
    MAX-ACCESS read-only
    STATUS
               deprecated
    DESCRIPTION
            "This object is a pointer to the natAddrMapTable entry
             (and the parameters of that entry) which was used in
             creating this BIND. This object, in conjunction with
             the ifIndex (which identifies a unique addrMapName)
             points to a unique entry in the natAddrMapTable."
    ::= { natAddrBindEntry 8 }
natAddrBindSessions OBJECT-TYPE
    SYNTAX
               Gauge32
    MAX-ACCESS read-only
               deprecated
    STATUS
    DESCRIPTION
            "Number of sessions currently using this BIND."
    ::= { natAddrBindEntry 9 }
natAddrBindMaxIdleTime OBJECT-TYPE
               TimeTicks
    SYNTAX
    MAX-ACCESS read-only
    STATUS
               deprecated
    DESCRIPTION
            "This object indicates the maximum time for
             which this bind can be idle with no sessions
             attached to it.
             The value of this object is of relevance only for
             dynamic NAT."
    ::= { natAddrBindEntry 10 }
natAddrBindCurrentIdleTime OBJECT-TYPE
    SYNTAX
               TimeTicks
    MAX-ACCESS read-only
    STATUS
               deprecated
    DESCRIPTION
            "At any given instance, this object indicates the
             time that this bind has been idle without any sessions
             attached to it.
```

Perreault, et al. Expires July 28, 2014 [Page 27]

```
The value of this object is of relevance only for
             dynamic NAT."
    ::= { natAddrBindEntry 11 }
natAddrBindInTranslates OBJECT-TYPE
   SYNTAX
              Counter64
   MAX-ACCESS read-only
   STATUS
               deprecated
   DESCRIPTION
            "The number of inbound packets that were successfully
             translated by using this bind entry.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times, as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natAddrBindEntry 12 }
natAddrBindOutTranslates OBJECT-TYPE
              Counter64
   SYNTAX
   MAX-ACCESS read-only
   STATUS
               deprecated
   DESCRIPTION
            "The number of outbound packets that were successfully
             translated using this bind entry.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natAddrBindEntry 13 }
-- Address Port Bind section
- -
natAddrPortBindNumberOfEntries OBJECT-TYPE
   SYNTAX
               Gauge32
   MAX-ACCESS read-only
               deprecated
   STATUS
   DESCRIPTION
            "This object maintains a count of the number of entries
             that currently exist in the natAddrPortBindTable."
    ::= { natMIBObjects 7 }
-- The NAT Address Port Bind Table
- -
```

```
natAddrPortBindTable OBJECT-TYPE
    SYNTAX
               SEQUENCE OF NatAddrPortBindEntry
   MAX-ACCESS not-accessible
   STATUS
               deprecated
   DESCRIPTION
            "This table holds information about the currently
             active NAPT BINDs."
    ::= { natMIBObjects 8 }
natAddrPortBindEntry OBJECT-TYPE
    SYNTAX
               NatAddrPortBindEntry
   MAX-ACCESS not-accessible
   STATUS
               deprecated
    DESCRIPTION
            "Each entry in the this table holds information
             about a NAPT bind that is currently active.
             These entries are lost upon agent restart.
             This row has indexing which may create variables with
             more than 128 subidentifiers. Implementers of this
             table must be careful not to create entries which would
             result in OIDs that exceed the 128 subidentifier limit.
             Otherwise, the information cannot be accessed using
             SNMPv1, SNMPv2c or SNMPv3."
    INDEX
            { ifIndex, natAddrPortBindLocalAddrType,
              natAddrPortBindLocalAddr, natAddrPortBindLocalPort,
              natAddrPortBindProtocol }
    ::= { natAddrPortBindTable 1 }
NatAddrPortBindEntry ::= SEQUENCE {
    natAddrPortBindLocalAddrType
                                        InetAddressType,
   natAddrPortBindLocalAddr
                                        InetAddress,
    natAddrPortBindLocalPort
                                        InetPortNumber,
   natAddrPortBindProtocol
                                        NatProtocolType,
   natAddrPortBindGlobalAddrType
                                        InetAddressType,
   natAddrPortBindGlobalAddr
                                        InetAddress,
    natAddrPortBindGlobalPort
                                        InetPortNumber,
   natAddrPortBindId
                                        NatBindId,
   natAddrPortBindTranslationEntity
                                        NatTranslationEntity,
   natAddrPortBindType
                                        NatAssociationType,
   natAddrPortBindMapIndex
                                        NatAddrMapId,
   natAddrPortBindSessions
                                        Gauge32,
   natAddrPortBindMaxIdleTime
                                        TimeTicks,
   natAddrPortBindCurrentIdleTime
                                        TimeTicks,
    natAddrPortBindInTranslates
                                        Counter64,
    natAddrPortBindOutTranslates
                                        Counter64
```

Perreault, et al. Expires July 28, 2014 [Page 29]

```
natAddrPortBindLocalAddrType OBJECT-TYPE
   SYNTAX
                InetAddressType
   MAX-ACCESS not-accessible
   STATUS
                deprecated
   DESCRIPTION
            "This object specifies the address type used for
             natAddrPortBindLocalAddr."
    ::= { natAddrPortBindEntry 1 }
natAddrPortBindLocalAddr OBJECT-TYPE
    SYNTAX
              InetAddress (SIZE(4|16))
   MAX-ACCESS not-accessible
   STATUS
             deprecated
    DESCRIPTION
            "This object represents the private-realm specific
             network layer address which, in conjunction with
             natAddrPortBindLocalPort, maps to the public-realm
             network layer address and transport id represented by
             natAddrPortBindGlobalAddr and natAddrPortBindGlobalPort
             respectively.
             The type of this address is determined by the value of
             the natAddrPortBindLocalAddrType object."
    ::= { natAddrPortBindEntry 2 }
natAddrPortBindLocalPort OBJECT-TYPE
    SYNTAX
              InetPortNumber
   MAX-ACCESS not-accessible
   STATUS
               deprecated
   DESCRIPTION
            "For a protocol value TCP or UDP, this object represents
             the private-realm specific port number. On the other
             hand, for ICMP a bind is created only for query/response
             type ICMP messages such as ICMP echo, Timestamp, and
             Information request messages, and this object represents
             the private-realm specific identifier in the ICMP
             message, as defined in <u>RFC 792</u> for ICMPv4 and in <u>RFC</u>
             2463 for ICMPv6.
             This object, together with natAddrPortBindProtocol,
             natAddrPortBindLocalAddrType, and
             natAddrPortBindLocalAddr, constitutes a session endpoint
             in the private realm. A bind entry binds a private
             realm specific endpoint to a public realm specific
             endpoint, as represented by the tuple of
             (natAddrPortBindGlobalPort, natAddrPortBindProtocol,
             natAddrPortBindGlobalAddrType, and
```

Perreault, et al. Expires July 28, 2014 [Page 30]

```
natAddrPortBindGlobalAddr)."
   ::= { natAddrPortBindEntry 3 }
natAddrPortBindProtocol OBJECT-TYPE
               NatProtocolType
    SYNTAX
   MAX-ACCESS not-accessible
   STATUS
               deprecated
   DESCRIPTION
            "This object specifies a protocol identifier. If the
             value of this object is none(1), then this bind entry
             applies to all IP traffic. Any other value of this
             object specifies the class of IP traffic to which this
             BIND applies."
    ::= { natAddrPortBindEntry 4 }
natAddrPortBindGlobalAddrType OBJECT-TYPE
                InetAddressType
   SYNTAX
   MAX-ACCESS read-only
   STATUS
               deprecated
   DESCRIPTION
            "This object specifies the address type used for
            natAddrPortBindGlobalAddr."
    ::= { natAddrPortBindEntry 5 }
natAddrPortBindGlobalAddr OBJECT-TYPE
   SYNTAX
              InetAddress
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "This object represents the public-realm specific network
             layer address that, in conjunction with
             natAddrPortBindGlobalPort, maps to the private-realm
             network layer address and transport id represented by
             natAddrPortBindLocalAddr and natAddrPortBindLocalPort,
             respectively.
             The type of this address is determined by the value of
             the natAddrPortBindGlobalAddrType object."
    ::= { natAddrPortBindEntry 6 }
natAddrPortBindGlobalPort OBJECT-TYPE
   SYNTAX
             InetPortNumber
   MAX-ACCESS read-only
   STATUS
             deprecated
   DESCRIPTION
            "For a protocol value TCP or UDP, this object represents
             the public-realm specific port number. On the other
```

Perreault, et al. Expires July 28, 2014 [Page 31]

```
hand, for ICMP a bind is created only for query/response type ICMP messages such as ICMP echo, Timestamp, and Information request messages, and this object represents the public-realm specific identifier in the ICMP message, as defined in RFC 792 for ICMPv4 and in RFC 2463 for ICMPv6.
```

This object, together with natAddrPortBindProtocol, natAddrPortBindGlobalAddrType, and natAddrPortBindGlobalAddr, constitutes a session endpoint in the public realm. A bind entry binds a public realm specific endpoint to a private realm specific endpoint, as represented by the tuple of (natAddrPortBindLocalPort, natAddrPortBindProtocol, natAddrPortBindLocalAddrType, and natAddrPortBindLocalAddr)."

::= { natAddrPortBindEntry 7 }

```
natAddrPortBindId OBJECT-TYPE
```

```
SYNTAX NatTranslationEntity
```

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

```
STATUS deprecated
```

DESCRIPTION

"This object represents the direction of sessions for which this bind is applicable and the entity (source or destination) within the sessions that is subject to translation with the BIND.

Orientation of the bind can be a superset of the translationEntity of the address map entry that forms the basis for this bind.

For example, if the translationEntity of an address map entry is outboundSrcEndPoint, the translationEntity of a bind derived from this map entry may either be outboundSrcEndPoint or may be bidirectional (a bitmask of

Perreault, et al. Expires July 28, 2014 [Page 32]

```
outboundSrcEndPoint and inboundDstEndPoint)."
    ::= { natAddrPortBindEntry 9 }
natAddrPortBindType OBJECT-TYPE
             NatAssociationType
    SYNTAX
   MAX-ACCESS read-only
             deprecated
   STATUS
   DESCRIPTION
            "This object indicates whether the bind is static or
            dynamic."
    ::= { natAddrPortBindEntry 10 }
natAddrPortBindMapIndex OBJECT-TYPE
   SYNTAX
              NatAddrMapId
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "This object is a pointer to the natAddrMapTable entry
             (and the parameters of that entry) used in
             creating this BIND. This object, in conjunction with
             the ifIndex (which identifies a unique addrMapName),
             points to a unique entry in the natAddrMapTable."
    ::= { natAddrPortBindEntry 11 }
natAddrPortBindSessions OBJECT-TYPE
   SYNTAX
              Gauge32
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "Number of sessions currently using this BIND."
    ::= { natAddrPortBindEntry 12 }
natAddrPortBindMaxIdleTime OBJECT-TYPE
   SYNTAX
             TimeTicks
   MAX-ACCESS read-only
   STATUS deprecated
   DESCRIPTION
            "This object indicates the maximum time for
            which this bind can be idle without any sessions
             attached to it.
             The value of this object is of relevance
             only for dynamic NAT."
    ::= { natAddrPortBindEntry 13 }
natAddrPortBindCurrentIdleTime OBJECT-TYPE
              TimeTicks
    SYNTAX
   MAX-ACCESS read-only
```

Perreault, et al. Expires July 28, 2014 [Page 33]

Internet-Draft

```
deprecated
   STATUS
   DESCRIPTION
            "At any given instance, this object indicates the
             time that this bind has been idle without any sessions
             attached to it.
             The value of this object is of relevance
             only for dynamic NAT."
    ::= { natAddrPortBindEntry 14 }
natAddrPortBindInTranslates OBJECT-TYPE
   SYNTAX
              Counter64
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "The number of inbound packets that were translated as
             per this bind entry.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times, as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natAddrPortBindEntry 15 }
natAddrPortBindOutTranslates OBJECT-TYPE
   SYNTAX
              Counter64
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "The number of outbound packets that were translated as
             per this bind entry.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times, as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natAddrPortBindEntry 16 }
- -
-- The Session Table
- -
natSessionTable OBJECT-TYPE
    SYNTAX
              SEQUENCE OF NatSessionEntry
   MAX-ACCESS not-accessible
   STATUS
              deprecated
   DESCRIPTION
            "The (conceptual) table containing one entry for each
```

```
NAT session currently active on this NAT device."
    ::= { natMIBObjects 9 }
natSessionEntry OBJECT-TYPE
    SYNTAX
               NatSessionEntry
   MAX-ACCESS not-accessible
   STATUS
               deprecated
   DESCRIPTION
            "An entry (conceptual row) containing information
             about an active NAT session on this NAT device.
             These entries are lost upon agent restart."
            { ifIndex, natSessionIndex }
    INDEX
    ::= { natSessionTable 1 }
NatSessionEntry ::= SEQUENCE {
    natSessionIndex
                                            NatSessionId,
   natSessionPrivateSrcEPBindId
                                            NatBindIdOrZero,
    natSessionPrivateSrcEPBindMode
                                            NatBindMode,
   natSessionPrivateDstEPBindId
                                            NatBindIdOrZero,
   natSessionPrivateDstEPBindMode
                                            NatBindMode,
   natSessionDirection
                                            INTEGER,
   natSessionUpTime
                                            TimeTicks,
   natSessionAddrMapIndex
                                            NatAddrMapId,
   natSessionProtocolType
                                            NatProtocolType,
   natSessionPrivateAddrType
                                            InetAddressType,
   natSessionPrivateSrcAddr
                                            InetAddress,
    natSessionPrivateSrcPort
                                            InetPortNumber,
   natSessionPrivateDstAddr
                                            InetAddress,
    natSessionPrivateDstPort
                                            InetPortNumber,
   natSessionPublicAddrType
                                            InetAddressType,
   natSessionPublicSrcAddr
                                            InetAddress,
   natSessionPublicSrcPort
                                            InetPortNumber,
   natSessionPublicDstAddr
                                            InetAddress,
   natSessionPublicDstPort
                                            InetPortNumber,
   natSessionMaxIdleTime
                                            TimeTicks,
   natSessionCurrentIdleTime
                                            TimeTicks,
   natSessionInTranslates
                                            Counter64,
   natSessionOutTranslates
                                            Counter64
}
natSessionIndex OBJECT-TYPE
   SYNTAX
               NatSessionId
   MAX-ACCESS not-accessible
   STATUS
               deprecated
   DESCRIPTION
            "The session ID for this NAT session."
    ::= { natSessionEntry 1 }
```

Perreault, et al. Expires July 28, 2014 [Page 35]

```
natSessionPrivateSrcEPBindId OBJECT-TYPE
   SYNTAX
              NatBindIdOrZero
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "The bind id associated between private and public
             source end points. In the case of Symmetric-NAT,
             this should be set to zero."
    ::= { natSessionEntry 2 }
natSessionPrivateSrcEPBindMode OBJECT-TYPE
   SYNTAX
             NatBindMode
   MAX-ACCESS read-only
   STATUS deprecated
   DESCRIPTION
            "This object indicates whether the bind indicated
             by the object natSessionPrivateSrcEPBindId
             is an address bind or an address port bind."
    ::= { natSessionEntry 3 }
natSessionPrivateDstEPBindId OBJECT-TYPE
   SYNTAX
             NatBindIdOrZero
   MAX-ACCESS read-only
              deprecated
   STATUS
   DESCRIPTION
            "The bind id associated between private and public
            destination end points."
    ::= { natSessionEntry 4 }
natSessionPrivateDstEPBindMode OBJECT-TYPE
   SYNTAX
              NatBindMode
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "This object indicates whether the bind indicated
             by the object natSessionPrivateDstEPBindId
             is an address bind or an address port bind."
    ::= { natSessionEntry 5 }
natSessionDirection OBJECT-TYPE
    SYNTAX
              INTEGER {
                  inbound (1),
                  outbound (2)
              }
   MAX-ACCESS read-only
   STATUS
              deprecated
    DESCRIPTION
```

Perreault, et al. Expires July 28, 2014 [Page 36]

```
"The direction of this session with respect to the
             local network. 'inbound' indicates that this session
            was initiated from the public network into the private
             network. 'outbound' indicates that this session was
             initiated from the private network into the public
             network."
    ::= { natSessionEntry 6 }
natSessionUpTime OBJECT-TYPE
   SYNTAX
              TimeTicks
   MAX-ACCESS read-only
              deprecated
   STATUS
   DESCRIPTION
            "The up time of this session in one-hundredths of a
             second."
    ::= { natSessionEntry 7 }
natSessionAddrMapIndex OBJECT-TYPE
   SYNTAX
               NatAddrMapId
   MAX-ACCESS read-only
   STATUS
             deprecated
   DESCRIPTION
            "This object is a pointer to the natAddrMapTable entry
             (and the parameters of that entry) used in
             creating this session. This object, in conjunction with
             the ifIndex (which identifies a unique addrMapName),
             points to a unique entry in the natAddrMapTable."
    ::= { natSessionEntry 8 }
natSessionProtocolType OBJECT-TYPE
               NatProtocolType
    SYNTAX
   MAX-ACCESS read-only
   STATUS
               deprecated
   DESCRIPTION
            "The protocol type of this session."
    ::= { natSessionEntry 9 }
natSessionPrivateAddrType OBJECT-TYPE
               InetAddressType
    SYNTAX
   MAX-ACCESS read-only
   STATUS
               deprecated
   DESCRIPTION
            "This object specifies the address type used for
            natSessionPrivateSrcAddr and natSessionPrivateDstAddr."
    ::= { natSessionEntry 10 }
natSessionPrivateSrcAddr OBJECT-TYPE
   SYNTAX
             InetAddress
```
Perreault, et al. Expires July 28, 2014 [Page 37]

```
MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "The source IP address of the session endpoint that
             lies in the private network.
             The value of this object must be zero only when the
             natSessionPrivateSrcEPBindId object has a zero value.
             When the value of this object is zero, the NAT session
             lookup will match any IP address to this field.
             The type of this address is determined by the value of
             the natSessionPrivateAddrType object."
    ::= { natSessionEntry 11 }
natSessionPrivateSrcPort OBJECT-TYPE
    SYNTAX
              InetPortNumber
   MAX-ACCESS read-only
             deprecated
   STATUS
   DESCRIPTION
            "When the value of protocol is TCP or UDP, this object
             represents the source port in the first packet of
             session while in private-realm. On the other hand, when
             the protocol is ICMP, a NAT session is created only for
             query/response type ICMP messages such as ICMP echo,
             Timestamp, and Information request messages, and this
             object represents the private-realm specific identifier
             in the ICMP message, as defined in <u>RFC 792</u> for ICMPv4
             and in RFC 2463 for ICMPv6.
             The value of this object must be zero when the
             natSessionPrivateSrcEPBindId object has zero value
             and value of natSessionPrivateSrcEPBindMode is
             addressPortBind(2). In such a case, the NAT session
             lookup will match any port number to this field.
             The value of this object must be zero when the object
             is not a representative field (SrcPort, DstPort, or
             ICMP identifier) of the session tuple in either the
             public realm or the private realm."
    ::= { natSessionEntry 12 }
natSessionPrivateDstAddr OBJECT-TYPE
              InetAddress
   SYNTAX
   MAX-ACCESS read-only
   STATUS
               deprecated
   DESCRIPTION
            "The destination IP address of the session endpoint that
```

Perreault, et al. Expires July 28, 2014 [Page 38]

```
lies in the private network.
             The value of this object must be zero when the
             natSessionPrivateDstEPBindId object has a zero value.
             In such a scenario, the NAT session lookup will match
             any IP address to this field.
             The type of this address is determined by the value of
             the natSessionPrivateAddrType object."
    ::= { natSessionEntry 13 }
natSessionPrivateDstPort OBJECT-TYPE
   SYNTAX
              InetPortNumber
   MAX-ACCESS read-only
              deprecated
   STATUS
   DESCRIPTION
            "When the value of protocol is TCP or UDP, this object
             represents the destination port in the first packet
             of session while in private-realm. On the other hand,
             when the protocol is ICMP, this object is not relevant
             and should be set to zero.
             The value of this object must be zero when the
             natSessionPrivateDstEPBindId object has a zero
             value and natSessionPrivateDstEPBindMode is set to
             addressPortBind(2). In such a case, the NAT session
             lookup will match any port number to this field.
             The value of this object must be zero when the object
             is not a representative field (SrcPort, DstPort, or
             ICMP identifier) of the session tuple in either the
             public realm or the private realm."
    ::= { natSessionEntry 14 }
natSessionPublicAddrType OBJECT-TYPE
   SYNTAX
                InetAddressType
   MAX-ACCESS read-only
   STATUS
                deprecated
    DESCRIPTION
            "This object specifies the address type used for
             natSessionPublicSrcAddr and natSessionPublicDstAddr."
    ::= { natSessionEntry 15 }
natSessionPublicSrcAddr OBJECT-TYPE
   SYNTAX
             InetAddress
   MAX-ACCESS read-only
   STATUS deprecated
    DESCRIPTION
```

NAT MIB

"The source IP address of the session endpoint that lies in the public network. The value of this object must be zero when the natSessionPrivateSrcEPBindId object has a zero value. In such a scenario, the NAT session lookup will match any IP address to this field. The type of this address is determined by the value of the natSessionPublicAddrType object." ::= { natSessionEntry 16 } natSessionPublicSrcPort OBJECT-TYPE SYNTAX InetPortNumber MAX-ACCESS read-only STATUS deprecated DESCRIPTION "When the value of protocol is TCP or UDP, this object represents the source port in the first packet of session while in public-realm. On the other hand, when protocol is ICMP, a NAT session is created only for query/response type ICMP messages such as ICMP echo, Timestamp, and Information request messages, and this object represents the public-realm specific identifier in the ICMP message, as defined in RFC 792 for ICMPv4 and in RFC 2463 for ICMPv6. The value of this object must be zero when the natSessionPrivateSrcEPBindId object has a zero value and natSessionPrivateSrcEPBindMode is set to addressPortBind(2). In such a scenario, the NAT session lookup will match any port number to this field. The value of this object must be zero when the object is not a representative field (SrcPort, DstPort or ICMP identifier) of the session tuple in either the public realm or the private realm." ::= { natSessionEntry 17 } natSessionPublicDstAddr OBJECT-TYPE InetAddress SYNTAX MAX-ACCESS read-only deprecated STATUS DESCRIPTION

> "The destination IP address of the session endpoint that lies in the public network.

NAT MIB

```
The value of this object must be non-zero when the
             natSessionPrivateDstEPBindId object has a non-zero
             value. If the value of this object and the
             corresponding natSessionPrivateDstEPBindId object value
             is zero, then the NAT session lookup will match any IP
             address to this field.
             The type of this address is determined by the value of
             the natSessionPublicAddrType object."
    ::= { natSessionEntry 18 }
natSessionPublicDstPort OBJECT-TYPE
             InetPortNumber
    SYNTAX
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "When the value of protocol is TCP or UDP, this object
             represents the destination port in the first packet of
             session while in public-realm. On the other hand, when
             the protocol is ICMP, this object is not relevant for
             translation and should be zero.
             The value of this object must be zero when the
             natSessionPrivateDstEPBindId object has a zero value
             and natSessionPrivateDstEPBindMode is
             addressPortBind(2). In such a scenario, the NAT
             session lookup will match any port number to this
             field.
             The value of this object must be zero when the object
             is not a representative field (SrcPort, DstPort, or
             ICMP identifier) of the session tuple in either the
             public realm or the private realm."
    ::= { natSessionEntry 19 }
natSessionMaxIdleTime OBJECT-TYPE
   SYNTAX
             TimeTicks
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "The max time for which this session can be idle
            without detecting a packet."
    ::= { natSessionEntry 20 }
natSessionCurrentIdleTime OBJECT-TYPE
    SYNTAX
              TimeTicks
   MAX-ACCESS read-only
   STATUS
             deprecated
```

Perreault, et al. Expires July 28, 2014 [Page 41]

```
DESCRIPTION
            "The time since a packet belonging to this session was
            last detected."
    ::= { natSessionEntry 21 }
natSessionInTranslates OBJECT-TYPE
    SYNTAX
             Counter64
    MAX-ACCESS read-only
    STATUS
              deprecated
    DESCRIPTION
            "The number of inbound packets that were translated for
             this session.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times, as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natSessionEntry 22 }
natSessionOutTranslates OBJECT-TYPE
    SYNTAX
             Counter64
    MAX-ACCESS read-only
    STATUS
              deprecated
    DESCRIPTION
            "The number of outbound packets that were translated for
             this session.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times, as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natSessionEntry 23 }
- -
-- The Protocol table
- -
natProtocolTable OBJECT-TYPE
    SYNTAX SEQUENCE OF NatProtocolEntry
    MAX-ACCESS not-accessible
    STATUS
              deprecated
    DESCRIPTION
            "The (conceptual) table containing per protocol NAT
             statistics."
    ::= { natMIBObjects 10 }
natProtocolEntry OBJECT-TYPE
    SYNTAX NatProtocolEntry
```

```
MAX-ACCESS not-accessible
   STATUS
               deprecated
   DESCRIPTION
           "An entry (conceptual row) containing NAT statistics
             pertaining to a particular protocol."
            { natProtocol }
    INDEX
    ::= { natProtocolTable 1 }
NatProtocolEntry ::= SEQUENCE {
   natProtocol
                                NatProtocolType,
   natProtocolInTranslates
                                Counter64,
   natProtocolOutTranslates
                                Counter64,
   natProtocolDiscards
                                Counter64
}
natProtocol
              OBJECT-TYPE
   SYNTAX
              NatProtocolType
   MAX-ACCESS not-accessible
   STATUS
             deprecated
   DESCRIPTION
            "This object represents the protocol pertaining to which
             parameters are reported."
    ::= { natProtocolEntry 1 }
natProtocolInTranslates OBJECT-TYPE
   SYNTAX
              Counter64
   MAX-ACCESS read-only
   STATUS
               deprecated
   DESCRIPTION
            "The number of inbound packets pertaining to the protocol
             identified by natProtocol that underwent NAT.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times, as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natProtocolEntry 2 }
natProtocolOutTranslates OBJECT-TYPE
   SYNTAX
              Counter64
   MAX-ACCESS read-only
   STATUS
               deprecated
   DESCRIPTION
            "The number of outbound packets pertaining to the
             protocol identified by natProtocol that underwent NAT.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
```

NAT MIB

Perreault, et al. Expires July 28, 2014 [Page 43]

Internet-Draft

```
other times, as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
    ::= { natProtocolEntry 3 }
natProtocolDiscards OBJECT-TYPE
    SYNTAX
             Counter64
   MAX-ACCESS read-only
   STATUS
              deprecated
   DESCRIPTION
            "The number of packets pertaining to the protocol
             identified by natProtocol that had to be
             rejected/dropped due to lack of resources. These
             rejections could be due to session timeout, resource
             unavailability, lack of address space, etc.
             Discontinuities in the value of this counter can occur
             at reinitialization of the management system and at
             other times, as indicated by the value of
             ifCounterDiscontinuityTime on the relevant interface."
     ::= { natProtocolEntry 4 }
-- Notifications section
- -
natMIBNotifications OBJECT IDENTIFIER ::= { natMIB 0 }
-- Notifications
- -
natPacketDiscard NOTIFICATION-TYPE
   OBJECTS { ifIndex }
   STATUS deprecated
   DESCRIPTION
            "This notification is generated when IP packets are
             discarded by the NAT function; e.g., due to lack of
             mapping space when NAT is out of addresses or ports.
             Note that the generation of natPacketDiscard
             notifications is throttled by the agent, as specified
             by the 'natNotifThrottlingInterval' object."
```

```
::= { natMIBNotifications 1 }
```

```
-- Conformance information.
```

- -

```
natMIBConformance OBJECT IDENTIFIER ::= { natMIB 2 }
natMIBGroups
                  OBJECT IDENTIFIER ::= { natMIBConformance 1 }
natMIBCompliances OBJECT IDENTIFIER ::= { natMIBConformance 2 }
-- Units of conformance
- -
natConfigGroup OBJECT-GROUP
   OBJECTS { natInterfaceRealm,
              natInterfaceServiceType,
              natInterfaceStorageType,
              natInterfaceRowStatus,
              natAddrMapName,
              natAddrMapEntryType,
              natAddrMapTranslationEntity,
              natAddrMapLocalAddrType,
              natAddrMapLocalAddrFrom,
              natAddrMapLocalAddrTo,
              natAddrMapLocalPortFrom,
              natAddrMapLocalPortTo,
              natAddrMapGlobalAddrType,
              natAddrMapGlobalAddrFrom,
              natAddrMapGlobalAddrTo,
              natAddrMapGlobalPortFrom,
              natAddrMapGlobalPortTo,
              natAddrMapProtocol,
              natAddrMapStorageType,
              natAddrMapRowStatus,
              natBindDefIdleTimeout,
              natUdpDefIdleTimeout,
              natIcmpDefIdleTimeout,
              natOtherDefIdleTimeout,
              natTcpDefIdleTimeout,
              natTcpDefNegTimeout,
              natNotifThrottlingInterval }
   STATUS deprecated
   DESCRIPTION
            "A collection of configuration-related information
             required to support management of devices supporting
             NAT."
    ::= { natMIBGroups 1 }
natTranslationGroup OBJECT-GROUP
   OBJECTS { natAddrBindNumberOfEntries,
```

Perreault, et al. Expires July 28, 2014 [Page 45]

natAddrBindGlobalAddrType, natAddrBindGlobalAddr, natAddrBindId, natAddrBindTranslationEntity, natAddrBindType, natAddrBindMapIndex, natAddrBindSessions, natAddrBindMaxIdleTime, natAddrBindCurrentIdleTime, natAddrBindInTranslates, natAddrBindOutTranslates, natAddrPortBindNumberOfEntries, natAddrPortBindGlobalAddrType, natAddrPortBindGlobalAddr, natAddrPortBindGlobalPort, natAddrPortBindId, natAddrPortBindTranslationEntity, natAddrPortBindType, natAddrPortBindMapIndex, natAddrPortBindSessions, natAddrPortBindMaxIdleTime, natAddrPortBindCurrentIdleTime, natAddrPortBindInTranslates, natAddrPortBindOutTranslates, natSessionPrivateSrcEPBindId, natSessionPrivateSrcEPBindMode, natSessionPrivateDstEPBindId, natSessionPrivateDstEPBindMode, natSessionDirection, natSessionUpTime, natSessionAddrMapIndex, natSessionProtocolType, natSessionPrivateAddrType, natSessionPrivateSrcAddr, natSessionPrivateSrcPort, natSessionPrivateDstAddr, natSessionPrivateDstPort, natSessionPublicAddrType, natSessionPublicSrcAddr, natSessionPublicSrcPort, natSessionPublicDstAddr, natSessionPublicDstPort, natSessionMaxIdleTime, natSessionCurrentIdleTime, natSessionInTranslates, natSessionOutTranslates }

STATUS deprecated

Perreault, et al. Expires July 28, 2014 [Page 46]

```
DESCRIPTION
            "A collection of BIND-related objects required to support
             management of devices supporting NAT."
    ::= { natMIBGroups 2 }
natStatsInterfaceGroup OBJECT-GROUP
   OBJECTS { natInterfaceInTranslates,
              natInterfaceOutTranslates,
              natInterfaceDiscards }
   STATUS deprecated
   DESCRIPTION
            "A collection of NAT statistics associated with the
             interface on which NAT is configured, to aid
             troubleshooting/monitoring of the NAT operation."
    ::= { natMIBGroups 3 }
natStatsProtocolGroup OBJECT-GROUP
   OBJECTS { natProtocolInTranslates,
              natProtocolOutTranslates,
              natProtocolDiscards }
   STATUS deprecated
   DESCRIPTION
            "A collection of protocol specific NAT statistics,
             to aid troubleshooting/monitoring of NAT operation."
    ::= { natMIBGroups 4 }
natStatsAddrMapGroup OBJECT-GROUP
   OBJECTS { natAddrMapInTranslates,
              natAddrMapOutTranslates,
              natAddrMapDiscards,
              natAddrMapAddrUsed }
   STATUS deprecated
    DESCRIPTION
            "A collection of address map specific NAT statistics,
             to aid troubleshooting/monitoring of NAT operation."
    ::= { natMIBGroups 5 }
natMIBNotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS { natPacketDiscard }
   STATUS
                  deprecated
   DESCRIPTION
            "A collection of notifications generated by
            devices supporting this MIB."
    ::= { natMIBGroups 6 }
```

```
- -
```

-- Compliance statements

Perreault, et al. Expires July 28, 2014 [Page 47]

- -

```
natMIBFullCompliance MODULE-COMPLIANCE
    STATUS deprecated
   DESCRIPTION
            "When this MIB is implemented with support for
             read-create, then such an implementation can claim
             full compliance. Such devices can then be both
             monitored and configured with this MIB.
             The following index objects cannot be added as OBJECT
             clauses but nevertheless have the compliance
             requirements:
                 п
             -- OBJECT natAddrBindLocalAddrType
             -- SYNTAX InetAddressType { ipv4(1), ipv6(2) }
             -- DESCRIPTION
                        "An implementation is required to support
             - -
                        global IPv4 and/or IPv6 addresses, depending
             - -
                        on its support for IPv4 and IPv6."
             - -
             -- OBJECT natAddrBindLocalAddr
             -- SYNTAX InetAddress (SIZE(4|16))
             -- DESCRIPTION
                        "An implementation is required to support
             - -
                         global IPv4 and/or IPv6 addresses, depending
             - -
                        on its support for IPv4 and IPv6."
             - -
             -- OBJECT natAddrPortBindLocalAddrType
             -- SYNTAX InetAddressType { ipv4(1), ipv6(2) }
             -- DESCRIPTION
                        "An implementation is required to support
             - -
                         global IPv4 and/or IPv6 addresses, depending
             - -
                         on its support for IPv4 and IPv6."
             - -
             -- OBJECT natAddrPortBindLocalAddr
             -- SYNTAX InetAddress (SIZE(4|16))
             -- DESCRIPTION
                        "An implementation is required to support
             - -
             - -
                         global IPv4 and/or IPv6 addresses, depending
                         on its support for IPv4 and IPv6."
             - -
   MODULE IF-MIB -- The interfaces MIB, RFC2863
      MANDATORY-GROUPS {
        ifCounterDiscontinuityGroup
      }
   MODULE -- this module
```

NAT MIB

```
MANDATORY-GROUPS { natConfigGroup, natTranslationGroup,
                   natStatsInterfaceGroup }
GROUP
            natStatsProtocolGroup
DESCRIPTION
         "This group is optional."
GROUP
            natStatsAddrMapGroup
DESCRIPTION
         "This group is optional."
GROUP
            natMIBNotificationGroup
DESCRIPTION
         "This group is optional."
OBJECT natAddrMapLocalAddrType
SYNTAX InetAddressType { ipv4(1), ipv6(2) }
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
         for IPv4 and IPv6."
OBJECT natAddrMapLocalAddrFrom
SYNTAX InetAddress (SIZE(4|16))
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
         for IPv4 and IPv6."
OBJECT natAddrMapLocalAddrTo
SYNTAX InetAddress (SIZE(4|16))
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
         for IPv4 and IPv6."
OBJECT natAddrMapGlobalAddrType
SYNTAX InetAddressType { ipv4(1), ipv6(2) }
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
         for IPv4 and IPv6."
OBJECT natAddrMapGlobalAddrFrom
SYNTAX InetAddress (SIZE(4|16))
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
         for IPv4 and IPv6."
```

```
OBJECT natAddrMapGlobalAddrTo
SYNTAX InetAddress (SIZE(4|16))
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
         for IPv4 and IPv6."
OBJECT natAddrBindGlobalAddrType
SYNTAX InetAddressType { ipv4(1), ipv6(2) }
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
         for IPv4 and IPv6."
OBJECT natAddrBindGlobalAddr
SYNTAX InetAddress (SIZE(4|16))
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
         for IPv4 and IPv6."
OBJECT natAddrPortBindGlobalAddrType
SYNTAX InetAddressType { ipv4(1), ipv6(2) }
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
        for IPv4 and IPv6."
OBJECT natAddrPortBindGlobalAddr
SYNTAX InetAddress (SIZE(4|16))
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
        for IPv4 and IPv6."
OBJECT natSessionPrivateAddrType
SYNTAX InetAddressType { ipv4(1), ipv6(2) }
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
         for IPv4 and IPv6."
OBJECT natSessionPrivateSrcAddr
SYNTAX InetAddress (SIZE(4|16))
DESCRIPTION
        "An implementation is required to support global IPv4
         and/or IPv6 addresses, depending on its support
         for IPv4 and IPv6."
```

Perreault, et al. Expires July 28, 2014 [Page 50]

```
OBJECT natSessionPrivateDstAddr
     SYNTAX InetAddress (SIZE(4|16))
     DESCRIPTION
              "An implementation is required to support global IPv4
               and/or IPv6 addresses, depending on its support
               for IPv4 and IPv6."
     OBJECT natSessionPublicAddrType
     SYNTAX InetAddressType { ipv4(1), ipv6(2) }
     DESCRIPTION
              "An implementation is required to support global IPv4
               and/or IPv6 addresses, depending on its support
               for IPv4 and IPv6."
     OBJECT natSessionPublicSrcAddr
     SYNTAX InetAddress (SIZE(4|16))
     DESCRIPTION
              "An implementation is required to support global IPv4
               and/or IPv6 addresses, depending on its support
               for IPv4 and IPv6."
     OBJECT natSessionPublicDstAddr
     SYNTAX InetAddress (SIZE(4|16))
     DESCRIPTION
              "An implementation is required to support global IPv4
               and/or IPv6 addresses, depending on its support
               for IPv4 and IPv6."
    ::= { natMIBCompliances 1 }
natMIBReadOnlyCompliance MODULE-COMPLIANCE
    STATUS deprecated
    DESCRIPTION
            "When this MIB is implemented without support for
             read-create (i.e., in read-only mode), then such an
             implementation can claim read-only compliance.
             Such a device can then be monitored but cannot be
             configured with this MIB.
             The following index objects cannot be added as OBJECT
             clauses but nevertheless have the compliance
             requirements:
             н
             -- OBJECT natAddrBindLocalAddrType
             -- SYNTAX InetAddressType { ipv4(1), ipv6(2) }
             -- DESCRIPTION
                        "An implementation is required to support
             - -
                         global IPv4 and/or IPv6 addresses, depending
             - -
```

Perreault, et al. Expires July 28, 2014 [Page 51]

Internet-Draft

NAT MIB

on its support for IPv4 and IPv6." - --- OBJECT natAddrBindLocalAddr -- SYNTAX InetAddress (SIZE(4|16)) -- DESCRIPTION "An implementation is required to support - global IPv4 and/or IPv6 addresses, depending - on its support for IPv4 and IPv6." - --- OBJECT natAddrPortBindLocalAddrType -- SYNTAX InetAddressType { ipv4(1), ipv6(2) } -- DESCRIPTION "An implementation is required to support _ _ global IPv4 and/or IPv6 addresses, depending - on its support for IPv4 and IPv6." -- OBJECT natAddrPortBindLocalAddr -- SYNTAX InetAddress (SIZE(4|16)) -- DESCRIPTION "An implementation is required to support - global IPv4 and/or IPv6 addresses, depending - on its support for IPv4 and IPv6." - -MODULE IF-MIB -- The interfaces MIB, RFC2863 MANDATORY-GROUPS { *ifCounterDiscontinuityGroup* } MODULE -- this module MANDATORY-GROUPS { natConfigGroup, natTranslationGroup, natStatsInterfaceGroup } GROUP natStatsProtocolGroup DESCRIPTION "This group is optional." GROUP natStatsAddrMapGroup DESCRIPTION "This group is optional." GROUP natMIBNotificationGroup DESCRIPTION "This group is optional." OBJECT natInterfaceRowStatus SYNTAX RowStatus { active(1) } read-only MIN-ACCESS DESCRIPTION "Write access is not required, and active is the only status that needs to be supported."

```
OBJECT natAddrMapLocalAddrType
SYNTAX InetAddressType { ipv4(1), ipv6(2) }
MTN-ACCESS
             read-only
DESCRIPTION
        "Write access is not required. An implementation is
         required to support global IPv4 and/or IPv6 addresses,
         depending on its support for IPv4 and IPv6."
OBJECT natAddrMapLocalAddrFrom
SYNTAX InetAddress (SIZE(4|16))
MIN-ACCESS
             read-only
DESCRIPTION
        "Write access is not required. An implementation is
         required to support global IPv4 and/or IPv6 addresses,
         depending on its support for IPv4 and IPv6."
OBJECT natAddrMapLocalAddrTo
SYNTAX InetAddress (SIZE(4|16))
MIN-ACCESS
             read-only
DESCRIPTION
        "Write access is not required. An implementation is
         required to support global IPv4 and/or IPv6 addresses,
         depending on its support for IPv4 and IPv6."
OBJECT natAddrMapGlobalAddrType
SYNTAX InetAddressType { ipv4(1), ipv6(2) }
MIN-ACCESS
             read-only
DESCRIPTION
        "Write access is not required. An implementation is
         required to support global IPv4 and/or IPv6 addresses,
         depending on its support for IPv4 and IPv6."
OBJECT natAddrMapGlobalAddrFrom
SYNTAX InetAddress (SIZE(4|16))
MIN-ACCESS
             read-only
DESCRIPTION
        "Write access is not required. An implementation is
         required to support global IPv4 and/or IPv6 addresses,
         depending on its support for IPv4 and IPv6."
OBJECT natAddrMapGlobalAddrTo
SYNTAX InetAddress (SIZE(4|16))
MIN-ACCESS
             read-only
DESCRIPTION
        "Write access is not required. An implementation is
         required to support global IPv4 and/or IPv6 addresses,
         depending on its support for IPv4 and IPv6."
```

Perreault, et al. Expires July 28, 2014 [Page 53]

OBJECT natAddrMapRowStatus SYNTAX RowStatus { active(1) } MIN-ACCESS read-only DESCRIPTION "Write access is not required, and active is the only status that needs to be supported." OBJECT natAddrBindGlobalAddrType SYNTAX InetAddressType { ipv4(1), ipv6(2) } DESCRIPTION "An implementation is required to support global IPv4 and/or IPv6 addresses, depending on its support for IPv4 and IPv6." OBJECT natAddrBindGlobalAddr SYNTAX InetAddress (SIZE(4|16)) DESCRIPTION "An implementation is required to support global IPv4 and/or IPv6 addresses, depending on its support for IPv4 and IPv6." OBJECT natAddrPortBindGlobalAddrType SYNTAX InetAddressType { ipv4(1), ipv6(2) } DESCRIPTION "An implementation is required to support global IPv4 and/or IPv6 addresses, depending on its support for IPv4 and IPv6." OBJECT natAddrPortBindGlobalAddr SYNTAX InetAddress (SIZE(4|16)) DESCRIPTION "An implementation is required to support global IPv4 and/or IPv6 addresses, depending on its support for IPv4 and IPv6." OBJECT natSessionPrivateAddrType SYNTAX InetAddressType { ipv4(1), ipv6(2) } DESCRIPTION "An implementation is required to support global IPv4 and/or IPv6 addresses, depending on its support for IPv4 and IPv6." OBJECT natSessionPrivateSrcAddr SYNTAX InetAddress (SIZE(4|16)) DESCRIPTION "An implementation is required to support global IPv4 and/or IPv6 addresses, depending on its support for IPv4 and IPv6."

Perreault, et al. Expires July 28, 2014 [Page 54]

```
OBJECT natSessionPrivateDstAddr
     SYNTAX InetAddress (SIZE(4|16))
     DESCRIPTION
             "An implementation is required to support global IPv4
              and/or IPv6 addresses, depending on its support for
              IPv4 and IPv6."
     OBJECT natSessionPublicAddrType
     SYNTAX InetAddressType { ipv4(1), ipv6(2) }
     DESCRIPTION
             "An implementation is required to support global IPv4
              and/or IPv6 addresses, depending on its support for
              IPv4 and IPv6."
     OBJECT natSessionPublicSrcAddr
     SYNTAX InetAddress (SIZE(4|16))
     DESCRIPTION
             "An implementation is required to support global IPv4
              and/or IPv6 addresses, depending on its support for
              IPv4 and IPv6."
     OBJECT natSessionPublicDstAddr
     SYNTAX InetAddress (SIZE(4|16))
     DESCRIPTION
             "An implementation is required to support global IPv4
              and/or IPv6 addresses, depending on its support for
              IPv4 and IPv6."
   ::= { natMIBCompliances 2 }
-- END OF DEPRECATED OBJECTS. CURRENT OBJECTS FOLLOW.
-- textual conventions
ProtocolNumber ::= TEXTUAL-CONVENTION
   DISPLAY-HINT "d"
   STATUS current
   DESCRIPTION
       "A transport protocol number, from the 'protocol-numbers'
        IANA registry."
   SYNTAX Unsigned32 (0..255)
NatPoolId ::= TEXTUAL-CONVENTION
   DISPLAY-HINT "d"
   STATUS current
```
```
DESCRIPTION
        "A unique ID that is assigned to each pool."
   SYNTAX Unsigned32 (1..4294967295)
NatBehaviorType ::= TEXTUAL-CONVENTION
   STATUS current
   DESCRIPTION
        "Behavior type as described in [RFC4787] sections 4.1 and 5."
   SYNTAX INTEGER {
        endpointIndependent (0),
        addressDependent (1),
        addressAndPortDependent (2)
   }
NatPoolingType ::= TEXTUAL-CONVENTION
   STATUS current
   DESCRIPTION
        "Pooling type as described in [<u>RFC4787</u>] sections <u>4.1</u>."
   SYNTAX INTEGER {
        arbitrary (0),
        paired (1)
   }
VlanIndexOrZero ::= TEXTUAL-CONVENTION
   DISPLAY-HINT "d"
   STATUS current
   DESCRIPTION
        "A value used to index per-VLAN tables: a value of 4095 is
         not permitted. A value of 0 indicates no index is present.
         If the value is between 1 and 4094 inclusive, it represents
         an IEEE 802.10 VLAN-ID with global scope within a given
         bridged domain (see VlanId textual convention in
         [<u>RFC4363</u>]). If the value is greater than 4095, then it
         represents a VLAN with scope local to the particular agent,
         i.e., one without a global VLAN-ID assigned to it. Such
         VLANs are outside the scope of IEEE 802.10, but it is
         convenient to be able to manage them in the same way using
         this MIB."
   SYNTAX
               Unsigned32
SubscriberIndex ::= TEXTUAL-CONVENTION
   DISPLAY-HINT "d"
   STATUS current
   DESCRIPTION
        "A unique ID that is assigned to each subscriber."
   SYNTAX Unsigned32 (1..4294967295)
SubscriberIdentifierType ::= TEXTUAL-CONVENTION
```

Perreault, et al. Expires July 28, 2014 [Page 56]

```
STATUS
            current
DESCRIPTION
    "Type of additional classifying information used by the NAT
     to identify the subscriber from an incoming packet, when
     the packet source address is not sufficient to do so
     unambiguously.
     null(0)
        No additional information is needed.
     interfaces(1)
        A set of one or more ingress interface indexes specified
        by the [<u>RFC2863</u>] InterfaceIndex textual convention.
     vlan(2)
        An ingress VLAN index using the VlanIndexOrZero textual
        convention, which is the [RFC4363] VlanIndex textual
        convention modified for local use in this MIB.
     vpn(3)
        An ingress layer 3 VPN identifier using the [RFC4265]
        VPNIdOrZero textual convention.
     ipencaps(4)
        Incoming source address of an encapsulating IPv4 or IPv6
        tunnel (e.g., IPv6 as used in DS-Lite, [RFC6333]) as
        defined by the InetAddressType and InetAddress textual
        conventions.
     other(5)
        The implementation supports other classifiers and/or
        combinations of classifier types. In the latter case the
        implementation MUST specify the semantics of the
        combination ('OR' or 'AND')."
SYNTAX
             INTEGER {
                 null(0),
                 interfaces(1),
                 vlan(2),
                 vpn(3),
                 ipencaps(4),
                 other(5)
```

```
}
SubsInterfaceIdRowIndex ::= TEXTUAL-CONVENTION
    DISPLAY-HINT "d"
    STATUS current
    DESCRIPTION
        "A unique ID that is assigned to each row in the
         natSubsInterfaceIdentifierTable."
    SYNTAX Unsigned32 (1..4294967295)
-- notifications
natNotifPoolWatermarkLow NOTIFICATION-TYPE
    OBJECTS { natPoolWatermarkLow }
    STATUS current
    DESCRIPTION
        "This notification is generated when a pool's usage
         percentage becomes lower than or equal to the specified
         threshold. The threshold is specified by the
         natPoolWatermarkLow object"
    ::= { natMIBNotifications 2 }
natNotifPoolWatermarkHigh NOTIFICATION-TYPE
    OBJECTS { natPoolWatermarkHigh }
    STATUS current
    DESCRIPTION
        "This notification is generated when a pool's usage
         percentage becomes greater than or equal to the specified
         threshold. The threshold is specified by the
         natPoolWatermarkHigh object"
    ::= { natMIBNotifications 3 }
natNotifMappings NOTIFICATION-TYPE
    OBJECTS { natMappingCreations, natMappingRemovals }
    STATUS current
    DESCRIPTION
        "This notification is generated when the number of active
        mappings exceeds the value of natMappingsNotifyThreshold."
    ::= { natMIBNotifications 4 }
natNotifAddrMappings NOTIFICATION-TYPE
    OBJECTS { natAddressMappingCreations, natAddressMappingRemovals }
    STATUS current
    DESCRIPTION
        "This notification is generated when the number of active
         address mappings exceeds the value of
         natAddrMapNotifyThreshold."
```

```
::= { natMIBNotifications 5 }
natNotifSubscriberMappings NOTIFICATION-TYPE
    OBJECTS { natSubscriberMappingCreations,
              natSubscriberMappingRemovals }
   STATUS current
   DESCRIPTION
        "This notification is generated when the number of active
         mappings exceeds the value of natSubscriberMapNotifyThresh,
         unless natSubscriberMapNotifyThresh is zero.."
    ::= { natMIBNotifications 6 }
-- instance table
natInstanceTable OBJECT-TYPE
   SYNTAX SEQUENCE OF NatInstanceEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Table of NAT instances."
    ::= { natMIBObjects 11 }
natInstanceEntry OBJECT-TYPE
   SYNTAX NatInstanceEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Objects related to a single NAT instance."
    INDEX { natInstanceIndex }
    ::= { natInstanceTable 1 }
NatInstanceEntry ::=
   SEQUENCE {
       natInstanceIndex Unsigned32,
        natInstanceAlias DisplayString
   }
natInstanceIndex OBJECT-TYPE
   SYNTAX Unsigned32
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "NAT instance index. Semantics of this number are
         implementation-specific. This object is used as an index for
         many tables defined below."
    ::= { natInstanceEntry 1 }
```

natInstanceAlias OBJECT-TYPE SYNTAX DisplayString (SIZE (0..64)) MAX-ACCESS read-write STATUS current DESCRIPTION "This object is an 'alias' name for the NAT instance as specified by a network manager, and provides a non-volatile 'handle' for the instance. On the first instantiation of a NAT instance, the value of natInstanceAlias associated with that instance is the zero-length string. As and when a value is written into an instance of natInstanceAlias through a network management set operation, then the agent must retain the supplied value in this obejct instance associated with the same interface for as long as that NAT instance remains instantiated, including across all re-initializations/reboots of the network management system, including those which result in a change of the interface's natInstanceIndex value. An example of the value which a network manager might store in this object for a NAT instance is the name/identifier of the interface that brings in internal traffic for this NAT instance or the name of the VRF for internal traffic. An agent may choose to provide read-only access if the agent itself assigns an identifier for the NAT instance. An agent which supports write access to this object is required to keep the value in non-valite storage, but it may limit the length of new values depending on how much storage is already occupied by the current values for other NAT instances." ::= { natInstanceEntry 2 } -- counters natCounters OBJECT IDENTIFIER ::= { natMIBObjects 12 } natCountersTable OBJECT-TYPE SYNTAX SEQUENCE OF NatCountersEntry MAX-ACCESS not-accessible STATUS current DESCRIPTION "Table of counters of a NAT instance. The counters are global across L4 protocols." ::= { natCounters 1 }

Internet-Draft

```
natCountersEntry OBJECT-TYPE
    SYNTAX NatCountersEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Counters related to a single NAT instance."
    INDEX { natInstanceIndex }
    ::= { natCountersTable 1 }
NatCountersEntry ::=
    SEQUENCE {
        natTranslations
                                    Counter64,
        natOutOfPortErrors
                                    Counter64,
        natResourceErrors
                                    Counter64,
        natQuotaDrops
                                    Counter64,
        natMappingCreations
                                    Counter64,
        natMappingRemovals
                                    Counter64,
        natAddressMappingCreations Counter64,
        natAddressMappingRemovals
                                    Counter64
    }
natTranslations OBJECT-TYPE
    SYNTAX Counter64
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of packets translated."
    ::= { natCountersEntry 1 }
natOutOfPortErrors OBJECT-TYPE
    SYNTAX Counter64
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of packets not translated because no external
         port was available, excluding quota limitations."
    ::= { natCountersEntry 2 }
natResourceErrors OBJECT-TYPE
    SYNTAX Counter64
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of packets not translated because of resource
         constraints (excluding out-of-ports error and quota drops)."
    ::= { natCountersEntry 3 }
```

Perreault, et al. Expires July 28, 2014 [Page 61]

```
SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "The number of incoming packets not translated because of
         quota limitations. Quotas include absolute limits as well
         as limits on rate of allocation."
    ::= { natCountersEntry 4 }
natMappingCreations OBJECT-TYPE
   SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Number of mapping creations. This includes static mappings."
    ::= { natCountersEntry 5 }
natMappingRemovals OBJECT-TYPE
   SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Number of mapping removals. This includes static mappings."
    ::= { natCountersEntry 6 }
natAddressMappingCreations OBJECT-TYPE
   SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Number of address mapping creations. This includes static
         mappings."
    ::= { natCountersEntry 7 }
natAddressMappingRemovals OBJECT-TYPE
   SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Number of address mapping removals. This includes static
        mappings.
         The number of active mappings is equal to
         natAddressMappingCreations - natAddressMappingRemovals."
    ::= { natCountersEntry 8 }
natL4ProtocolTable OBJECT-TYPE
   SYNTAX SEQUENCE OF NatL4ProtocolEntry
```

Perreault, et al. Expires July 28, 2014 [Page 62]

```
MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Table of protocols with per-protocol counters."
    ::= { natCounters 2 }
natL4ProtocolEntry OBJECT-TYPE
    SYNTAX NatL4ProtocolEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Per-protocol counters."
    INDEX { natInstanceIndex, natL4ProtocolNumber }
    ::= { natL4ProtocolTable 1 }
NatL4ProtocolEntry ::=
    SEQUENCE {
        natL4ProtocolNumber
                                       ProtocolNumber,
        natL4ProtocolTranslations
                                       Counter64,
        natL4ProtocolOutOfPortErrors
                                       Counter64,
        natL4ProtocolResourceErrors
                                       Counter64,
        natL4ProtocolQuotaDrops
                                       Counter64,
        natL4ProtocolMappingCreations Counter64,
        natL4ProtocolMappingRemovals Counter64
    }
natL4ProtocolNumber OBJECT-TYPE
    SYNTAX ProtocolNumber
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Counters in this conceptual row apply to packets using the
         transport protocol identified by this object's value."
    ::= { natL4ProtocolEntry 1 }
natL4ProtocolTranslations OBJECT-TYPE
    SYNTAX Counter64
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of packets translated."
    ::= { natL4ProtocolEntry 2 }
natL4ProtocolOutOfPortErrors OBJECT-TYPE
    SYNTAX Counter64
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
```

Perreault, et al. Expires July 28, 2014 [Page 63]

```
"The number of packets not translated because no external
         port was available."
    ::= { natL4ProtocolEntry 3 }
natL4ProtocolResourceErrors OBJECT-TYPE
    SYNTAX Counter64
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of packets not translated because of resource
         constraints (excluding out-of-ports errors and quota
         drops)."
    ::= { natL4ProtocolEntry 4 }
natL4ProtocolQuotaDrops OBJECT-TYPE
    SYNTAX Counter64
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The number of incoming packets not translated because of
         exceeded quotas. Quotas include absolute limits as well as
         limits on rate of allocation."
    ::= { natL4ProtocolEntry 5 }
natL4ProtocolMappingCreations OBJECT-TYPE
    SYNTAX Counter64
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Number of mapping creations. This includes static mappings."
    ::= { natL4ProtocolEntry 6 }
natL4ProtocolMappingRemovals OBJECT-TYPE
    SYNTAX Counter64
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Number of mapping removals. This includes static mappings.
         The number of active mappings is equal to
         natL4ProtocolMappingCreations -
         natL4ProtocolMappingRemovals."
    ::= { natL4ProtocolEntry 7 }
```

-- limits

natLimitsTable OBJECT-TYPE

```
SYNTAX SEQUENCE OF NatLimitsEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Table of limits for a NAT instance."
    ::= { natMIBObjects 13 }
natLimitsEntry OBJECT-TYPE
   SYNTAX NatLimitsEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Limit related to a single NAT instance."
    INDEX { natInstanceIndex }
    ::= { natLimitsTable 1 }
NatLimitsEntry ::=
   SEQUENCE {
        natLimitMappings
                                    Unsigned32,
        natMappingsNotifyThreshold Unsigned32,
        natLimitAddressMappings
                                    Unsigned32,
        natAddrMapNotifyThreshold
                                    Unsigned32,
        natLimitFragments
                                    Unsigned32,
        natLimitSubscribers
                                    Unsigned32
   }
natLimitMappings OBJECT-TYPE
   SYNTAX Unsigned32
   MAX-ACCESS read-write
   STATUS current
   DESCRIPTION
        "Global limit on the total number of mappings. Zero means
         unlimited."
    ::= { natLimitsEntry 1 }
natMappingsNotifyThreshold OBJECT-TYPE
   SYNTAX Unsigned32
   MAX-ACCESS read-write
   STATUS current
   DESCRIPTION
        "See natNotifMappings."
    ::= { natLimitsEntry 2 }
natLimitAddressMappings OBJECT-TYPE
   SYNTAX Unsigned32
   MAX-ACCESS read-write
   STATUS current
   DESCRIPTION
```

Perreault, et al. Expires July 28, 2014 [Page 65]

```
"Global limit on the total number of internal-to-external
         address mappings. Zero means unlimited.
        This limit is only applicable to NATs that have an 'IP
         address pooling' behavior of 'Paired' [RFC4787]."
    ::= { natLimitsEntry 3 }
natAddrMapNotifyThreshold OBJECT-TYPE
    SYNTAX Unsigned32
   MAX-ACCESS read-write
   STATUS current
   DESCRIPTION
        "See natNotifAddrMappings."
    ::= { natLimitsEntry 4 }
natLimitFragments OBJECT-TYPE
   SYNTAX Unsigned32
   MAX-ACCESS read-write
   STATUS current
   DESCRIPTION
        "Global limit on the total number of fragments pending
         reassembly. Zero means unlimited.
        This limit is only applicable to NATs having 'Receive
         Fragments Out of Order' behavior [RFC4787]."
    ::= { natLimitsEntry 5 }
natLimitSubscribers OBJECT-TYPE
   SYNTAX Unsigned32
   MAX-ACCESS read-write
   STATUS current
   DESCRIPTION
        "Global limit on the number of subscribers with active
        mappings. Zero means unlimited."
    ::= { natLimitsEntry 6 }
-- pools
natPoolObjects OBJECT IDENTIFIER ::= { natMIBObjects 14 }
natPoolTable OBJECT-TYPE
    SYNTAX SEQUENCE OF NatPoolEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Table of pools."
    ::= { natPoolObjects 1 }
```

```
natPoolEntry OBJECT-TYPE
    SYNTAX NatPoolEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Entry in the table of pools."
    INDEX { natInstanceIndex, natPoolIndex }
    ::= { natPoolTable 1 }
NatPoolEntry ::=
    SEQUENCE {
        natPoolIndex
                            NatPoolId,
        natPoolRealm
                             SnmpAdminString,
        natPoolWatermarkLow Integer32,
        natPoolWatermarkHigh Integer32,
                           InetPortNumber,
        natPoolPortMin
        natPoolPortMax
                            InetPortNumber
    }
natPoolIndex OBJECT-TYPE
    SYNTAX NatPoolId
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Index of an address pool."
    ::= { natPoolEntry 1 }
natPoolRealm OBJECT-TYPE
    SYNTAX SnmpAdminString (SIZE (0..32))
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Realm to which this pool's addresses belong."
    ::= { natPoolEntry 2 }
natPoolWatermarkLow OBJECT-TYPE
    SYNTAX Integer32 (-1|0..100)
    MAX-ACCESS read-create
    STATUS current
    DESCRIPTION
        "Low watermark on a pool's usage, in percentage of the total
         number of ports available. If set to -1, the watermark is
         disabled. Otherwise when the usage percentage becomes lower
         than or equal to natPoolWatermarkLow, a notification is
         sent. The NAT may also start behaving in low usage mode
         (this is implementation-defined).
         The pool's current usage percentage can be computed by
```

Perreault, et al. Expires July 28, 2014 [Page 67]

```
summing (natPoolRangeAllocations -
         natPoolRangeDeallocations) over all address ranges
         belonging to this pool, then dividing by the total number of
         IP addresses in this pool and by the size of the port range
         in this pool (natPoolPortMax - natPoolPortMin + 1)."
    ::= { natPoolEntry 3 }
natPoolWatermarkHigh OBJECT-TYPE
    SYNTAX Integer32 (-1|0..100)
    MAX-ACCESS read-create
    STATUS current
    DESCRIPTION
        "High watermark on a pool's usage, in percentage of the total
         number of ports available. If set to -1, the watermark is
         disabled. Otherwise, when the usage percentage becomes
         higher than or equal to natPoolWatermarkHigh, a notification
         is sent. The NAT may also start behaving in high usage mode
         (this is implementation-defined)."
    ::= { natPoolEntry 4 }
natPoolPortMin OBJECT-TYPE
    SYNTAX InetPortNumber
    MAX-ACCESS read-create
    STATUS current
    DESCRIPTION
        "Minimal port number to be allocated in this pool."
    ::= { natPoolEntry 5 }
natPoolPortMax OBJECT-TYPE
    SYNTAX InetPortNumber
    MAX-ACCESS read-create
    STATUS current
    DESCRIPTION
        "Maximal port number to be allocated in this pool."
    ::= { natPoolEntry 6 }
natPoolRangeTable OBJECT-TYPE
    SYNTAX SEQUENCE OF NatPoolRangeEntry
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "This table contains address ranges used by pool entries."
    ::= { natPoolObjects 2 }
natPoolRangeEntry OBJECT-TYPE
    SYNTAX NatPoolRangeEntry
    MAX-ACCESS not-accessible
```

Perreault, et al. Expires July 28, 2014 [Page 68]

```
STATUS current
    DESCRIPTION
        "NAT pool address range."
    INDEX { natInstanceIndex, natPoolRangePoolIndex }
    ::= { natPoolRangeTable 1 }
NatPoolRangeEntry ::=
    SEQUENCE {
        natPoolRangePoolIndex
                                     NatPoolId,
        natPoolRangeType
                                     InetAddressType,
        natPoolRangeBegin
                                     InetAddress,
        natPoolRangeEnd
                                     InetAddress,
        natPoolRangeAllocations
                                    Counter64,
        natPoolRangeDeallocations Counter64
    }
natPoolRangePoolIndex OBJECT-TYPE
    SYNTAX NatPoolId
    MAX-ACCESS not-accessible
    STATUS current
    DESCRIPTION
        "Index of the address pool to which this address range
         belongs. See natPoolIndex."
    ::= { natPoolRangeEntry 1 }
natPoolRangeType OBJECT-TYPE
    SYNTAX InetAddressType
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "The address type of natPoolRangeBegin and
         natPoolRangeEnd."
    ::= { natPoolRangeEntry 2 }
natPoolRangeBegin OBJECT-TYPE
    SYNTAX InetAddress
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Lowest address included in this range."
    ::= { natPoolRangeEntry 3 }
natPoolRangeEnd OBJECT-TYPE
    SYNTAX InetAddress
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Highest address included in this range."
```

Perreault, et al. Expires July 28, 2014 [Page 69]

```
::= { natPoolRangeEntry 4 }
natPoolRangeAllocations OBJECT-TYPE
    SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Number of ports that have been allocated on the addresses in
         this range."
    ::= { natPoolRangeEntry 5 }
natPoolRangeDeallocations OBJECT-TYPE
   SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Number of ports that have been allocated and then
         deallocated on the addresses in this range.
         The number of ports currently allocated on the addresses in
         this range can be computed by subtracting
         natPoolRangeDeallocations from natPoolRangeAllocations."
    ::= { natPoolRangeEntry 6 }
-- indexed mapping tables
natMapObjects OBJECT IDENTIFIER ::= { natMIBObjects 15 }
natMapIntAddrTable OBJECT-TYPE
   SYNTAX SEQUENCE OF NatMapIntAddrEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Table of mappings from internal to external address.
         This table is only applicable to NATs that have an 'IP
         address pooling' behavior of 'Paired' [RFC4787]."
    ::= { natMapObjects 1 }
natMapIntAddrEntry OBJECT-TYPE
   SYNTAX NatMapIntAddrEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Mapping from internal to external address."
    INDEX { natInstanceIndex,
            natMapIntAddrIntRealm,
```

```
natMapIntAddrIntType,
            natMapIntAddrInt }
    ::= { natMapIntAddrTable 1 }
NatMapIntAddrEntry ::=
    SEQUENCE {
                                SnmpAdminString,
       natMapIntAddrIntRealm
        natMapIntAddrExtRealm
                                SnmpAdminString,
        natMapIntAddrIntType
                                InetAddressType,
        natMapIntAddrInt
                                InetAddress,
        natMapIntAddrExtType
                                InetAddressType,
        natMapIntAddrExt
                                InetAddress,
        natMapIntAddrSubsIndex Unsigned32
   }
natMapIntAddrIntRealm OBJECT-TYPE
   SYNTAX SnmpAdminString (SIZE(0..32))
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Realm to which natMapIntAddrInt belongs."
    ::= { natMapIntAddrEntry 1 }
natMapIntAddrExtRealm OBJECT-TYPE
    SYNTAX SnmpAdminString
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Realm to which natMapIntAddrExt belongs."
    ::= { natMapIntAddrEntry 2 }
natMapIntAddrIntType OBJECT-TYPE
   SYNTAX InetAddressType
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Address type for natMapIntAddrInt."
    ::= { natMapIntAddrEntry 3 }
natMapIntAddrInt OBJECT-TYPE
    SYNTAX InetAddress (SIZE (4|16))
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Internal address."
    ::= { natMapIntAddrEntry 4 }
natMapIntAddrExtType OBJECT-TYPE
```

Perreault, et al. Expires July 28, 2014 [Page 71]

```
SYNTAX InetAddressType
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Address type for natMapIntAddrExt."
    ::= { natMapIntAddrEntry 5 }
natMapIntAddrExt OBJECT-TYPE
   SYNTAX InetAddress
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "External address."
    ::= { natMapIntAddrEntry 6 }
natMapIntAddrSubsIndex OBJECT-TYPE
   SYNTAX Unsigned32 (0|1..4294967295)
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Subscriber to which this address mapping applies, or zero if
         it applies to all subscribers."
    ::= { natMapIntAddrEntry 7 }
natMappingTable OBJECT-TYPE
   SYNTAX SEQUENCE OF NatMappingEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Table of mappings indexed by external 3-tuple."
    ::= { natMapObjects 2 }
natMappingEntry OBJECT-TYPE
   SYNTAX NatMappingEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "A single NAT mapping."
    INDEX { natInstanceIndex,
            natMappingProto,
            natMappingExtRealm,
            natMappingExtAddressType,
            natMappingExtAddress,
            natMappingExtPort }
    ::= { natMappingTable 1 }
NatMappingEntry ::=
   SEQUENCE {
```

Perreault, et al. Expires July 28, 2014 [Page 72]

```
natMappingProto
                                 ProtocolNumber,
        natMappingExtRealm
                                 SnmpAdminString,
        natMappingExtAddressType InetAddressType,
        natMappingExtAddress
                                 InetAddress,
        natMappingExtPort
                                 InetPortNumber,
        natMappingIntRealm
                                 SnmpAdminString,
        natMappingIntAddressType InetAddressType,
        natMappingIntAddress
                                 InetAddress,
        natMappingIntPort
                                 InetPortNumber,
        natMappingPool
                                 Unsigned32,
        natMappingMapBehavior
                                 NatBehaviorType,
        natMappingFilterBehavior NatBehaviorType,
        natMappingAddressPooling NatPoolingType,
                                 SubscriberIndex
        natMappingSubsIndex
   }
natMappingProto OBJECT-TYPE
    SYNTAX ProtocolNumber
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "The mapping's transport protocol number."
    ::= { natMappingEntry 1 }
natMappingExtRealm OBJECT-TYPE
    SYNTAX SnmpAdminString (SIZE(0..32))
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "The realm to which natMappingExtAddress belongs."
    ::= { natMappingEntry 2 }
natMappingExtAddressType OBJECT-TYPE
    SYNTAX InetAddressType
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Type of the mapping's external address."
    ::= { natMappingEntry 3 }
natMappingExtAddress OBJECT-TYPE
    SYNTAX InetAddress (SIZE (4|16))
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "The mapping's external address. If this is the undefined
         address, all external addresses are mapped to the internal
         address."
```
Perreault, et al. Expires July 28, 2014 [Page 73]

```
::= { natMappingEntry 4 }
natMappingExtPort OBJECT-TYPE
    SYNTAX InetPortNumber
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "The mapping's external port number. If this is zero, all
         external ports are mapped to the internal port."
    ::= { natMappingEntry 5 }
natMappingIntRealm OBJECT-TYPE
   SYNTAX SnmpAdminString
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
       "The realm to which natMappingIntAddress belongs."
    ::= { natMappingEntry 6 }
natMappingIntAddressType OBJECT-TYPE
   SYNTAX InetAddressType
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Type of the mapping's internal address."
    ::= { natMappingEntry 7 }
natMappingIntAddress OBJECT-TYPE
   SYNTAX InetAddress
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "The mapping's internal address. If this is the undefined
         address, addresses are not translated."
    ::= { natMappingEntry 8 }
natMappingIntPort OBJECT-TYPE
   SYNTAX InetPortNumber
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "The mapping's internal port number. If this is zero, ports
         are not translated."
    ::= { natMappingEntry 9 }
natMappingPool OBJECT-TYPE
    SYNTAX Unsigned32 (0|1..4294967295)
   MAX-ACCESS read-only
```

Perreault, et al. Expires July 28, 2014 [Page 74]

```
STATUS current
   DESCRIPTION
        "Index of the pool that contains this mapping's external
         address and port. If zero, no pool is associated with this
         mapping."
    ::= { natMappingEntry 10 }
natMappingMapBehavior OBJECT-TYPE
   SYNTAX NatBehaviorType
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Mapping behavior as described in [RFC4787] section 4.1."
    ::= { natMappingEntry 11 }
natMappingFilterBehavior OBJECT-TYPE
   SYNTAX NatBehaviorType
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Filtering behavior as described in [RFC4787] section 5."
    ::= { natMappingEntry 12 }
natMappingAddressPooling OBJECT-TYPE
   SYNTAX NatPoolingType
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Type of address pooling behavior that was used to create
        this mapping."
    ::= { natMappingEntry 13 }
natMappingSubsIndex OBJECT-TYPE
   SYNTAX SubscriberIndex
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Subscriber using this mapping."
    ::= { natMappingEntry 14 }
-- subscribers
natSubscribers OBJECT IDENTIFIER ::= { natMIBObjects 16 }
natSubscribersTable OBJECT-TYPE
    SYNTAX SEQUENCE OF NatSubscribersEntry
   MAX-ACCESS not-accessible
```

```
STATUS current
   DESCRIPTION
        "Table of CGN subscribers."
    ::= { natSubscribers 1 }
natSubscribersEntry OBJECT-TYPE
   SYNTAX NatSubscribersEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Each entry describes a single CGN subscriber or a host
         served by a managed enterprise NAT."
    INDEX { natInstanceIndex,
            natSubscriberIndex }
    ::= { natSubscribersTable 1 }
NatSubscribersEntry ::=
   SEQUENCE {
        natSubscriberIndex
                                          SubscriberIndex,
                                          SubscriberIdentifierType,
        natSubscriberIdentifierType
        natSubscriberIntPrefixType
                                          InetAddressType,
        natSubscriberIntPrefix
                                          InetAddress,
        natSubscriberIntPrefixLength
                                          InetAddressPrefixLength,
        natSubscriberRealm
                                          SnmpAdminString,
        natSubscriberTranslations
                                          Counter64,
        natSubscriberOutOfPortErrors
                                          Counter64,
        natSubscriberResourceErrors
                                          Counter64,
        natSubscriberQuotaDrops
                                          Counter64,
        natSubscriberMappingCreations
                                          Counter64,
        natSubscriberMappingRemovals
                                          Counter64,
        natSubscriberLimitMappings
                                          Unsigned32,
        natSubscriberMapNotifyThresh
                                          Unsigned32,
        natSubscriberVlanIdentifier
                                          VlanIndexOrZero,
        natSubscriberVpnIdentifier
                                          VPNIdOrZero,
        natSubscriberIPEncapsIdType
                                          InetAddressType,
                                          InetAddress
        natSubscriberIPEncapsIdAddr
    }
natSubscriberIndex OBJECT-TYPE
   SYNTAX SubscriberIndex
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Index of the subscriber or host."
    ::= { natSubscribersEntry 1 }
natSubscriberIdentifierType OBJECT-TYPE
    SYNTAX SubscriberIdentifierType
```

Perreault, et al. Expires July 28, 2014 [Page 76]

```
MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Type of additional information needed to identify the
         subscriber or host from incoming packets, when the packet
         source address does not do so unambiguously.
         The implementation MUST ensure that the type and the
         identifier value provided are synchronized, as follows.
         Unused identifier values MUST be zero or equivalent.
         Туре
                        Identifier object
         null(0)
                        None.
         interfaces(1) natSubsInterfaceIdentifierTable
         vlan(2)
                        natSubscriberVlanIdentifier
         vpn(3) natSubscriberVpnIdentifier
ipencaps(4) natSubscriberIPEncapsIdType and
                        natSubscriberIPEncapsIdAddr
         other(5)
                        As specified by the implementation"
    ::= { natSubscribersEntry 2 }
natSubscriberIntPrefixType OBJECT-TYPE
    SYNTAX InetAddressType
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Subscriber's internal prefix type."
    ::= { natSubscribersEntry 3 }
natSubscriberIntPrefix OBJECT-TYPE
    SYNTAX InetAddress
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Prefix assigned to a subscriber's CPE."
    ::= { natSubscribersEntry 4 }
natSubscriberIntPrefixLength OBJECT-TYPE
    SYNTAX InetAddressPrefixLength
    MAX-ACCESS read-only
    STATUS current
    DESCRIPTION
        "Length of the prefix assigned to a subscriber's CPE, in
         bits. In case a single address is assigned, this will be 32
         for IPv4 and 128 for IPv6."
    ::= { natSubscribersEntry 5 }
```

```
natSubscriberRealm OBJECT-TYPE
   SYNTAX SnmpAdminString
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "The realm to which this subscriber belongs."
    ::= { natSubscribersEntry 6 }
natSubscriberTranslations OBJECT-TYPE
   SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "The number of translated packets received from or sent to
         this subscriber."
    ::= { natSubscribersEntry 7 }
natSubscriberOutOfPortErrors OBJECT-TYPE
   SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "The number of packets received from this subscriber not
         translated because no external port was available, excluding
         quota limitations."
    ::= { natSubscribersEntry 8 }
natSubscriberResourceErrors OBJECT-TYPE
   SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "The number of packets received from this subscriber not
         translated because of resource constraints (excluding
         out-of-port errors and quota drops)."
    ::= { natSubscribersEntry 9 }
natSubscriberQuotaDrops OBJECT-TYPE
    SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "The number of incoming packets received from or destined to
         this subscriber not translated because of quota limitations.
         Quotas include absolute limits as well as limits on the rate
         of allocation."
    ::= { natSubscribersEntry 10 }
```

Perreault, et al. Expires July 28, 2014 [Page 78]

```
natSubscriberMappingCreations OBJECT-TYPE
   SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Number of mappings created by or for this subscriber."
    ::= { natSubscribersEntry 11 }
natSubscriberMappingRemovals OBJECT-TYPE
   SYNTAX Counter64
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Number of mappings removed by or for this subscriber."
    ::= { natSubscribersEntry 12 }
natSubscriberLimitMappings OBJECT-TYPE
   SYNTAX Unsigned32
   MAX-ACCESS read-write
   STATUS current
   DESCRIPTION
        "Limit on the number of active mappings created by or for
         this subscriber. Zero means unlimited."
    ::= { natSubscribersEntry 13 }
natSubscriberMapNotifyThresh OBJECT-TYPE
   SYNTAX Unsigned32
   MAX-ACCESS read-write
   STATUS current
   DESCRIPTION
        "See natNotifSubscriberMappings."
    ::= { natSubscribersEntry 14 }
natSubscriberVlanIdentifier OBJECT-TYPE
   SYNTAX VlanIndexOrZero
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "When non-zero, VLAN index used to identify subscriber in
         combination with packet source address."
    ::= { natSubscribersEntry 15 }
natSubscriberVpnIdentifier OBJECT-TYPE
   SYNTAX VPNIdOrZero
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "When non-zero, VPN identifier used to identify subscriber
```

Perreault, et al. Expires July 28, 2014 [Page 79]

NAT MIB

```
in combination with packet source address."
    ::= { natSubscribersEntry 16 }
natSubscriberIPEncapsIdType OBJECT-TYPE
    SYNTAX InetAddressType
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
       "When not unknown(0), type of address of encapsulating IP
        ingress tunnel."
    ::= { natSubscribersEntry 17 }
natSubscriberIPEncapsIdAddr OBJECT-TYPE
   SYNTAX InetAddress
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Source address in outer header of packets incoming via IP
         tunnel, used to identify subscriber in combination with
         inner packet source address."
    ::= { natSubscribersEntry 18 }
natSubsInterfaceIdentifierTable OBJECT-TYPE
   SYNTAX SEQUENCE OF NatSubsInterfaceIdentifierEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Table of interface indexes. If non-empty, used along with
        packet source address to identify the subscriber sending
         the packet. 'OR' semantics if multiple interface indexes
        are present."
    ::= { natSubscribers 2 }
natSubsInterfaceIdentifierEntry OBJECT-TYPE
   SYNTAX NatSubsInterfaceIdentifierEntry
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Each entry provides a single interface index."
    INDEX { natInstanceIndex,
            natSubsInterfaceIdSubsIndex,
            natSubsInterfaceIdRowIndex }
    ::= { natSubsInterfaceIdentifierTable 1 }
NatSubsInterfaceIdentifierEntry ::=
    SEQUENCE {
        natSubsInterfaceIdSubsIndex
                                         SubscriberIndex,
        natSubsInterfaceIdRowIndex
                                         SubsInterfaceIdRowIndex,
```

Perreault, et al. Expires July 28, 2014 [Page 80]

```
natSubsInterfaceIndex
                                         InterfaceIndex
   }
natSubsInterfaceIdSubsIndex OBJECT-TYPE
    SYNTAX SubscriberIndex
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Index of the subscriber to which this conceptual table is
         related."
    ::= { natSubsInterfaceIdentifierEntry 1 }
natSubsInterfaceIdRowIndex OBJECT-TYPE
   SYNTAX SubsInterfaceIdRowIndex
   MAX-ACCESS not-accessible
   STATUS current
   DESCRIPTION
        "Row index."
    ::= { natSubsInterfaceIdentifierEntry 2 }
natSubsInterfaceIndex OBJECT-TYPE
   SYNTAX InterfaceIndex
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION
        "Interface index of an ingress interface through which
         packets from this subscriber may flow."
    ::= { natSubsInterfaceIdentifierEntry 3 }
-- object groups
natGroupStatelessObjects OBJECT-GROUP
   OBJECTS { natInstanceAlias,
              natTranslations,
              natResourceErrors,
              natQuotaDrops,
              natMappingCreations,
              natMappingRemovals,
              natL4ProtocolTranslations ,
              natL4ProtocolResourceErrors,
              natL4ProtocolQuotaDrops,
              natL4ProtocolMappingCreations,
              natL4ProtocolMappingRemovals,
              natMappingIntRealm,
              natMappingIntAddressType,
              natMappingIntAddress,
              natMappingIntPort,
```

Perreault, et al. Expires July 28, 2014 [Page 81]

```
natMappingPool,
              natMappingMapBehavior,
              natMappingFilterBehavior }
   STATUS current
   DESCRIPTION
        "Basic counters, limits, and thresholds that do not require
         stateful NAT. That is, they apply to both stateless and
         stateful NATs.
         For this MIB's purposes, stateless NATs are defined as NATs
         that do not create mappings dynamically (either implicitly
         or explicitly using, for instance, the Port Control
         Protocol). Their mappings are created statically by the NAT
         administrator."
    ::= { natMIBGroups 7 }
natGroupStatefulObjects OBJECT-GROUP
   OBJECTS { natOutOfPortErrors,
              natL4ProtocolOutOfPortErrors,
              natLimitMappings,
              natMappingsNotifyThreshold,
              natPoolRealm,
              natPoolWatermarkLow,
              natPoolWatermarkHigh,
              natPoolPortMin,
              natPoolPortMax,
              natPoolRangeType,
              natPoolRangeBegin,
              natPoolRangeEnd,
              natPoolRangeAllocations,
              natPoolRangeDeallocations,
              natMappingAddressPooling }
   STATUS current
   DESCRIPTION
        "Basic counters, limits, and thresholds that require stateful
         NAT."
    ::= { natMIBGroups 8 }
natGroupAddrMapObjects OBJECT-GROUP
    OBJECTS { natAddressMappingCreations,
              natAddressMappingRemovals,
              natLimitAddressMappings,
              natAddrMapNotifyThreshold,
              natMapIntAddrExtRealm,
              natMapIntAddrExtType,
              natMapIntAddrExt }
   STATUS current
   DESCRIPTION
```

Perreault, et al. Expires July 28, 2014 [Page 82]

```
"Objects that require 'Paired IP address pooling' behavior
         [<u>RFC4787</u>]."
    ::= { natMIBGroups 9 }
natGroupFragmentObjects OBJECT-GROUP
    OBJECTS { natLimitFragments }
   STATUS current
   DESCRIPTION
        "Objects that require 'Receive Fragments Out of Order'
         behavior [RFC4787]."
    ::= { natMIBGroups 10 }
natGroupBasicNotifications NOTIFICATION-GROUP
    NOTIFICATIONS { natNotifPoolWatermarkLow,
                    natNotifPoolWatermarkHigh,
                    natNotifMappings }
   STATUS current
   DESCRIPTION
        "Basic notifications."
    ::= { natMIBGroups 11 }
natGroupAddrMapNotifications NOTIFICATION-GROUP
   NOTIFICATIONS { natNotifAddrMappings }
   STATUS current
   DESCRIPTION
        "Notifications about address mappings."
    ::= { natMIBGroups 12 }
natGroupSubscriberObjects OBJECT-GROUP
    OBJECTS { natMapIntAddrSubsIndex,
              natMappingSubsIndex,
              natSubscriberIdentifierType,
              natSubscriberIntPrefixType,
              natSubscriberIntPrefix,
              natSubscriberIntPrefixLength,
              natSubscriberRealm,
              natSubscriberTranslations,
              natSubscriberOutOfPortErrors,
              natSubscriberResourceErrors,
              natSubscriberQuotaDrops,
              natSubscriberMappingCreations,
              natSubscriberMappingRemovals,
              natSubscriberLimitMappings,
              natSubscriberVlanIdentifier,
              natSubscriberVpnIdentifier,
              natSubscriberIPEncapsIdType,
              natSubscriberIPEncapsIdAddr,
              natSubsInterfaceIndex,
```

Perreault, et al. Expires July 28, 2014 [Page 83]

```
natLimitSubscribers,
              natSubscriberMapNotifyThresh }
   STATUS current
   DESCRIPTION
        "Per-subscriber counters, limits, and thresholds."
    ::= { natMIBGroups 13 }
natGroupSubscriberNotifications NOTIFICATION-GROUP
   NOTIFICATIONS { natNotifSubscriberMappings }
   STATUS current
   DESCRIPTION
        "Subscriber notifications."
    ::= { natMIBGroups 14 }
-- compliance statements
natBasicStatelessCompliance MODULE-COMPLIANCE
   STATUS current
   DESCRIPTION
        "Basic stateless compliance with this MIB is attained when
         the objects contained in the mandatory groups are
         implemented."
   MODULE -- this module
       MANDATORY-GROUPS { natGroupStatelessObjects }
                   natInstanceAlias
        OBJECT
        MIN-ACCESS read-only
        DESCRIPTION
            "Write access is not required."
    ::= { natMIBCompliances 3 }
natBasicStatefulCompliance MODULE-COMPLIANCE
   STATUS current
   DESCRIPTION
        "Basic stateful compliance with this MIB is attained when the
         objects contained in the mandatory groups are implemented."
   MODULE -- this module
        MANDATORY-GROUPS { natGroupStatelessObjects,
                           natGroupStatefulObjects,
                           natGroupBasicNotifications }
    ::= { natMIBCompliances 4 }
natAddrMapCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "NATs that have 'Paired IP address pooling' behavior
```

NAT MIB

```
[RFC4787] and implement the objects in this group can claim
         this level of compliance."
   MODULE -- this module
       MANDATORY-GROUPS { natGroupStatelessObjects,
                           natGroupStatefulObjects,
                           natGroupBasicNotifications,
                           natGroupAddrMapObjects,
                           natGroupAddrMapNotifications }
    ::= { natMIBCompliances 5 }
natFragmentsCompliance MODULE-COMPLIANCE
   STATUS current
   DESCRIPTION
        "NATs that have 'Receive Fragments Out of Order' behavior
         [RFC4787] and implement the objects in this group can claim
        this level of compliance."
   MODULE -- this module
        MANDATORY-GROUPS { natGroupStatelessObjects,
                           natGroupStatefulObjects,
                           natGroupBasicNotifications,
                           natGroupFragmentObjects }
    ::= { natMIBCompliances 6 }
natCGNCompliance MODULE-COMPLIANCE
   STATUS current
   DESCRIPTION
        "NATs that have 'Paired IP address pooling' and 'Receive
         Fragments Out of Order' behavior [RFC4787] and implement the
        objects in this group can claim this level of compliance.
        This level of compliance is to be expected of a CGN
         compliant with [RFC6888]."
   MODULE -- this module
        MANDATORY-GROUPS { natGroupStatelessObjects,
                           natGroupStatefulObjects,
                           natGroupBasicNotifications,
                           natGroupAddrMapObjects,
                           natGroupAddrMapNotifications,
                           natGroupFragmentObjects,
                           natGroupSubscriberObjects,
                           natGroupSubscriberNotifications }
    ::= { natMIBCompliances 7 }
```

<u>5</u>. Security Considerations

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

Limits: An attacker setting a very low or very high limit can easily cause a denial-of-service situation.

- * natLimitMappings
- * natLimitAddressMappings
- * natLimitFragments
- * natLimitSubscribers
- * natSubscriberLimitMappings

Notification thresholds: An attacker setting an arbitrarily low treshold can cause many useless notifications to be generated. Setting an arbitrarily high threshold can effectively disable notifications, which could be used to hide another attack.

- * natMappingsNotifyThreshold
- * natAddrMapNotifyThreshold
- * natSubscriberMapNotifyThresh

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:

Objects that reveal host identities: Various objects can reveal the identity of private hosts that are engaged in a session with external end nodes. A curious outsider could monitor these to assess the number of private hosts being supported by the NAT device. Further, a disgruntled former employee of an enterprise could use the information to break into specific private hosts by

intercepting the existing sessions or originating new sessions into the host.

- * natMapIntAddrType
- * natMapIntAddrInt
- * natMapIntAddrExt
- * natMappingIntRealm
- * natMappingIntAddressType
- * natMappingIntAddress
- * natMappingIntPort
- * natMappingMapBehavior
- * natMappingFilterBehavior
- * natMappingAddressPooling
- * natSubscriberIntPrefixType
- * natSubscriberIntPrefix
- * natSubscriberIntPrefixLength

Other objects that reveal NAT state: Other managed objects in this MIB may contain information that may be sensitive from a business perspective, in that they may represent NAT state information.

- * natCntAddressMappings
- * natCntProtocolMappings
- * natPoolUsage
- * natPoolRangeAllocatedPorts
- * natSubscriberCntMappings

There are no objects that are sensitive in their own right, such as passwords or monetary amounts.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPsec),

NAT MIB

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.

Implementations SHOULD provide the security features described by the SNMPv3 framework (see [RFC3410]), and implementations claiming compliance to the SNMPv3 standard MUST include full support for authentication and privacy via the User-based Security Model (USM) [RFC3414] with the AES cipher algorithm [RFC3826]. Implementations MAY also provide support for the Transport Security Model (TSM) [RFC5591] in combination with a secure transport such as SSH [RFC5592] or TLS/DTLS [RFC6353].

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.

<u>6</u>. IANA Considerations

IANA has assigned object identifier 123 to the natMIB module, with prefix iso.org.dod.internet.mgmt.mib-2 in the Network Management Parameters registry [<u>SMI-NUMBERS</u>].

No IANA actions are required by this document.

7. References

7.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", <u>BCP 14</u>, <u>RFC 2119</u>, March 1997.
- [RFC2578] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Structure of Management Information Version 2 (SMIv2)", STD 58, <u>RFC 2578</u>, April 1999.
- [RFC2579] McCloghrie, K., Ed., Perkins, D., Ed., and J. Schoenwaelder, Ed., "Textual Conventions for SMIv2", STD 58, <u>RFC 2579</u>, April 1999.
- [RFC2580] McCloghrie, K., Perkins, D., and J. Schoenwaelder, "Conformance Statements for SMIv2", STD 58, <u>RFC 2580</u>, April 1999.

NAT MIB

- [RFC2863] McCloghrie, K. and F. Kastenholz, "The Interfaces Group MIB", <u>RFC 2863</u>, June 2000.
- [RFC3414] Blumenthal, U. and B. Wijnen, "User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)", STD 62, <u>RFC 3414</u>, December 2002.
- [RFC3826] Blumenthal, U., Maino, F., and K. McCloghrie, "The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model", <u>RFC 3826</u>, June 2004.
- [RFC4001] Daniele, M., Haberman, B., Routhier, S., and J. Schoenwaelder, "Textual Conventions for Internet Network Addresses", <u>RFC 4001</u>, February 2005.
- [RFC4265] Schliesser, B. and T. Nadeau, "Definition of Textual Conventions for Virtual Private Network (VPN) Management", <u>RFC 4265</u>, November 2005.
- [RFC4363] Levi, D. and D. Harrington, "Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering, and Virtual LAN Extensions", <u>RFC 4363</u>, January 2006.
- [RFC4750] Joyal, D., Galecki, P., Giacalone, S., Coltun, R., and F. Baker, "OSPF Version 2 Management Information Base", <u>RFC</u> 4750, December 2006.
- [RFC4787] Audet, F. and C. Jennings, "Network Address Translation (NAT) Behavioral Requirements for Unicast UDP", <u>BCP 127</u>, <u>RFC 4787</u>, January 2007.
- [RFC5591] Harrington, D. and W. Hardaker, "Transport Security Model for the Simple Network Management Protocol (SNMP)", <u>RFC</u> <u>5591</u>, June 2009.
- [RFC5592] Harrington, D., Salowey, J., and W. Hardaker, "Secure Shell Transport Model for the Simple Network Management Protocol (SNMP)", <u>RFC 5592</u>, June 2009.
- [RFC6353] Hardaker, W., "Transport Layer Security (TLS) Transport Model for the Simple Network Management Protocol (SNMP)", <u>RFC 6353</u>, July 2011.

<u>7.2</u>. Informative References

- [RFC2663] Srisuresh, P. and M. Holdrege, "IP Network Address Translator (NAT) Terminology and Considerations", <u>RFC</u> <u>2663</u>, August 1999.
- [RFC3022] Srisuresh, P. and K. Egevang, "Traditional IP Network Address Translator (Traditional NAT)", <u>RFC 3022</u>, January 2001.
- [RFC3410] Case, J., Mundy, R., Partain, D., and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.
- [RFC4008] Rohit, R., Srisuresh, P., Raghunarayan, R., Pai, N., and C. Wang, "Definitions of Managed Objects for Network Address Translators (NAT)", <u>RFC 4008</u>, March 2005.
- [RFC6333] Durand, A., Droms, R., Woodyatt, J., and Y. Lee, "Dual-Stack Lite Broadband Deployments Following IPv4 Exhaustion", <u>RFC 6333</u>, August 2011.
- [RFC6674] Brockners, F., Gundavelli, S., Speicher, S., and D. Ward, "Gateway-Initiated Dual-Stack Lite Deployment", <u>RFC 6674</u>, July 2012.
- [RFC6888] Perreault, S., Yamagata, I., Miyakawa, S., Nakagawa, A., and H. Ashida, "Common Requirements for Carrier-Grade NATs (CGNs)", <u>BCP 127</u>, <u>RFC 6888</u>, April 2013.

[SMI-NUMBERS]

, "Network Management Parameters registry at IANA", ,
<<u>http://www.iana.org/assignments/smi-numbers</u>>.

Authors' Addresses

Simon Perreault Viagenie 246 Aberdeen Quebec, QC G1R 2E1 Canada

Phone: +1 418 656 9254 Email: simon.perreault@viagenie.ca URI: <u>http://viagenie.ca</u>

Tina Tsou Huawei Technologies (USA) 2330 Central Expressway Santa Clara, CA 95050 USA

Phone: +1 408 330 4424 Email: tina.tsou.zouting@huawei.com

Senthil Sivakumar Cisco Systems 7100-8 Kit Creek Road Research Triangle Park, North Carolina 27709 USA

Phone: +1 919 392 5158 Email: ssenthil@cisco.com
