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Definitions of Managed Objects for Network Address Translators (NAT)

Status of This Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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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 configuration as well as monitoring of a device capable of NAT function.

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1. Introduction

This memo defines a portion of the Management Information Base (MIB) for devices implementing NAT function. This MIB module may be used for configuration and monitoring of a device capable of NAT function. 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 describes the terms used throughout the document. Section 4 provides an overview of the key objects, their inter-relationship, and how the MIB module may be used to configure and monitor a NAT device. Lastly, section 5 has the complete NAT MIB definition.

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

2. The Internet-Standard Management Framework

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

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP).

Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIv2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

3. Terminology

Definitions for a majority of the terms used throughout the document may be found in RFC 2663 [RFC2663]. Additional terms that further classify NAPT implementations are defined in RFC 3489 [RFC3489]. Listed below are terms used in this document.

Address realm - An address realm is a realm of unique network addresses that are routable within the realm. For example, an enterprise address realm could be constituted of private IP addresses in the ranges specified in RFC 1918 [RFC1918], which are routable within the enterprise, but not across the Internet. A public realm is constituted of globally unique network addresses.

Symmetric NAT - Symmetric NAT, as defined in RFC 3489 [RFC3489], is a variation of Network Address Port Translator (NAPT). Symmetric NAT does not use port bind for translation across all sessions originating from the same private host. Instead, it assigns a new public port to each new session, irrespective of whether the new session used the same private end-point as before.

Bind or Binding - Several variations of the term ’Bind’ (or ’Binding’) are used throughout the document. Address Bind (or Address Binding) is a tuple of (Private IP address, Public IP Address) used for translating an IP address end-point in IP packets. Port Bind (or, Port Binding, or Address Port Bind, or Address Port Binding) is a tuple of (transport protocol, Private IP address, Private port, Public IP Address, Public port) used for translating a port end-point tuple of (transport protocol, IP address, port). Bind is used to refer to either Address Bind or Port Bind. Bind Mode identifies whether a bind is Address Bind or Port Bind.

NAT Session - A NAT session is an association between a session as seen in the private realm and a session as seen in the public realm, by virtue of NAT translation. If a session in the private realm were to be represented as (PrivateSrcAddr, PrivateDstAddr, TransportProtocol, PrivateSrcPort, PrivateDstPort) and the same session in the public realm were to be represented as (PublicSrcAddr, PublicDstAddr, TransportProtocol, PublicSrcPort, PublicDstPort), the NAT session will provide the translation glue between the two session representations. NAT sessions in the document are restricted to sessions based on TCP and UDP only. In the future, NAT sessions may be extended to be based on other transport protocols such as SCTP, UDP-lite and DCCP.

The terms 'local' and 'private' are used interchangeably throughout the document when referring to private networks, IP addresses, and ports. Likewise, the terms 'global' and 'public' are used interchangeably when referring to public networks, IP addresses, and ports.

4. Overview

NAT MIB is configurable on a per-interface basis and depends in several parts on the IF-MIB [RFC2863].

NAT MIB requires that an interface for which NAT is configured be connected to either a private or a public realm. The realm association of the interface plays an important role in the definition of address maps for the interface. An address map entry identifies the orientation of the session (inbound or outbound to the interface) for which the entry may be used for NAT translation. The address map entry also identifies the end-point of the session that must be subject to translation. An SNMP Textual-Convention 'NatTranslationEntity' is defined to capture this important characteristic that combines session orientation and applicable session endpoint for translation.

An address map may consist of static or dynamic entries. NAT creates static binds from a static address map entry. Each static bind has a direct one-to-one relationship with a static address map entry. NAT creates dynamic binds from a dynamic address map entry upon seeing the first packet of a new session.

The following subsections define the key objects used in NAT MIB, their inter-relationship, and how to configure a NAT device using the MIB module.

4.1. natInterfaceTable

natInterfaceTable is defined in the MIB module to configure interface specific realm type and the NAT services enabled for the interface. natInterfaceTable is indexed by ifIndex and also includes interface specific NAT statistics.

The first step for an operator in configuring a NAT device is determining the interface over which NAT service is to be configured. When NAT service is operational, translated packets traverse the NAT device by ingressing on a private interface and egressing on a public interface or vice versa. An operator may configure the NAT service on either the public interface or the private interface in the traversal path.

As the next step, the operator must identify the NAT service(s) desired for the interface. The operator may configure one or more NAT services on the same interface. The MIB module identifies four types of NAT services: Basic NAT, NAPT, twice NAT and bidirectional NAT. These are NAT varieties as defined in RFC 2663 [RFC2663]. Note that RFC 3489 [RFC3489] further classifies NAPT implementations based on the behavior exhibited by the NAPT devices from different vendors. However, the MIB module does not explicitly distinguish between the NAPT implementations. NAPT implementations may be distinguished between one another by monitoring the BIND and NAT Session objects generated by the NAT device as described in section 4.6.

4.2. natAddrMapTable

natAddrMapTable is defined in the MIB module to configure address maps on a per-interface basis. natAddrMapTable is indexed by the tuple of (ifIndex, natAddrMapIndex). The same table is also used to collect Statistics for the address map entries. Address maps are key to NAT configuration. An operator may configure one or more address map entries per interface. NAT looks up address map entries in the order in which they are defined to determine the translation function at the start of each new session traversing the interface. An address map may consist of static or dynamic entries. A static address map entry has a direct one-to-one relationship with binds. NAT will dynamically create binds from a dynamic address map entry.

The operator must be careful in selecting address map entries for an interface based on the interface realm-type and the type of NAT service desired. The operator can be amiss in the selection of address map entries when not paying attention to the associated interface characteristics defined in natInterfaceTable (described in section 4.1). For example, say the operator wishes to configure a NAPT map entry on an interface of a NAT device. If the operator chooses to configure the NAPT map entry on a public interface (i.e., interface realm-type is public), the operator should set the TranslationEntity of the NAPT address map entry to be outboundSrcEndPoint. On the other hand, if the operator chooses to configure the NAPT map entry on a private interface (i.e., interface realm-type is private), the operator should set the TranslationEntity of the NAPT address map entry to be InboundSrcEndPoint.

4.3. Default Timeouts, Protocol Table, and Other Scalars

DefTimeouts is defined in the MIB module to configure idle Bind timeout and IP protocol specific idle NAT session timeouts. The timeouts defined are global to the system and are not interface specific.

Protocol specific statistics are maintained in natProtocolTable, which is indexed by the protocol type.

The scalars natAddrBindNumberOfEntries and natAddrPortBindNumberOfEntries hold the number of entries that currently exist in the Address Bind and the Address Port Bind tables, respectively.

The generation of natPacketDiscard notifications can be configured by using the natNotifThrottlingInterval scalar MIB object.

4.4. natAddrBindTable and natAddrPortBindTable

Two Bind tables, natAddrBindTable and natAddrPortBindTable, are defined to hold the bind entries. Entries are derived from the address map table and are not configurable. natAddrBindTable contains Address Binds, and natAddrPortBindTable contains Address Port Binds. natAddrBindTable is indexed by the tuple of (ifIndex, LocalAddrType, LocalAddr). natAddrPortBindTable is indexed by the tuple of (ifIndex, LocalAddrType, LocalAddr, LocalPort, Protocol). These tables also maintain bind specific statistics. A Symmetric NAT will have no entries in the Bind tables.

4.5. natSessionTable

natSessionTable is defined to hold NAT session entries. NAT session entries are derived from NAT Binds (except in the case of Symmetric NAT) and are not configurable.

The NAT session provides the necessary translation glue between two session representations of the same end-to-end session; that is, a session as seen in the private realm and in the public realm. Session orientation (inbound or outbound) is determined from the orientation of the first packet traversing the NAT interface. Address map entries and bind entries on the interface determine whether a session is subject to NAT translation. One or both endpoints of a session may be subject to translation.

With the exception of symmetric NAT, all other NAT functions use end-point specific bind to perform individual end-point translations. Multiple NAT sessions would use the same bind as long as they share the same endpoint. Symmetric NAT does not retain a consistent port bind across multiple sessions using the same endpoint. For this reason, the bind identifier for a NAT session in symmetric NAT is set to zero. natSessionTable is indexed by the tuple of (ifIndex, natSessionIndex). Statistics for NAT sessions are also maintained in the same table.

4.6. RFC 3489 NAPT Variations, NAT Session and Bind Tables

[RFC3489] defines four variations of NAPT - Full Cone, Restricted Cone, Port Restricted Cone, and Symmetric NAT. These can be differentiated in the NAT MIB based on different values for the objects in the session and the bind tables, as indicated below.

In a Port Restricted Cone NAT, NAT Session objects will contain a non-zero PrivateSrcEPBindId object. Further, all address and port objects within a NAT session will have non-zero values (i.e., no wildcard matches).

An Address Restricted Cone NAT may have been implemented in the same way as a Port Restricted Cone NAT, except that the UDP NAT Sessions may use ANY match on PrivateDstPort and PublicDstPort objects; i.e., PrivateDstPort and PublicDstPort objects within a NAT session may be set to zero.

A Full Cone NAT may have also been implemented in the same way as a Port Restricted Cone NAT, except that the UDP NAT Sessions may use ANY match on PrivateDstAddr, PrivateDstPort, PublicDstAddr, and PublicDstPort objects. Within a NAT Session, all four of these objects may be set to zero. Alternately, all address and port objects within a NAT Session may have non-zero values, yet the TranslationEntity of the PrivateSrcEPBindId for the NAT Sessions may be set bi-directionally, i.e., as a bit mask of (outboundSrcEndPoint and inboundDstEndPoint) or (inboundSrcEndPoint and outboundDstEndPoint), depending on the interface realm type. Lastly, a Symmetric NAT does not maintain Port Bindings. As such, the NAT Session objects will have the PrivateSrcEPBindId set to zero.

4.7. Notifications

natPacketDiscard notifies the end user/manager of packets being discarded due to lack of address mappings.

4.8. Relation Among Tables

The association between the various NAT tables can be represented as follows:

```
                         Interface
                             |
                             |
                             |
                        Address map
                             |
                             |
                             |
        ----------------------------------------------
       |                                              |
       |                                              |
       |                                              |
   Address Bind                                   Port Bind
       |                                              |
       |                                              |
       |                                              |
        ----------------------------------------------
                             |
                             |
                             |
                         NAT Session
```

All NAT functions, with the exception of Symmetric NAT, use Bind(s) to provide the glue necessary for a NAT Session. natSessionPrivateSrcEPBindId and natSessionPrivateDstEPBindId objects represent the endpoint Binds used by NAT Sessions.

4.9. Configuration via the MIB

Sections 4.1 and 4.2 and part of section 4.3 refer to objects that are configurable on a NAT device. NAT derives Address Bind and Address Port Bind entries from the Address Map table. Hence, an Address Bind or an Address Port Bind entry must not exist without an associated entry in the Address Map table.

Further, NAT derives NAT session entries from NAT Binds, except in the case of symmetric NAT, which derives translation parameters for a NAT session directly from an address map entry. Hence, with the exception of Symmetric NAT, a NAT session entry must not exist in the NAT Session table without a corresponding bind.

A Management station may use the following steps to configure entries in the NAT-MIB:

- Create an entry in the natInterfaceTable specifying the value of ifIndex as the interface index of the interface on which NAT is being configured. Specify appropriate values, as applicable, for the other objects (e.g., natInterfaceRealm, natInterfaceServiceType) in the table (refer to Section 4.1).

- Create one or more address map entries sequentially in reduced order of priority in the natAddrMapTable, specifying the value of ifIndex to be the same for all entries. The ifIndex specified would be the same as that specified for natInterfaceTable (refer to Section 4.2).

- Configure the maximum permitted idle time duration for BINDs and TCP, UDP, and ICMP protocol sessions by setting the relevant scalars in natDefTimeouts object (refer to Section 4.3).

4.10. Relationship to Interface MIB

The natInterfaceTable specifies the NAT configuration attributes on each interface. The concept of "interface" is as defined by InterfaceIndex/ifIndex of the IETF Interfaces MIB [RFC2863].

5. Definitions

This MIB module IMPORTs objects from RFCs 2578 [RFC2578], 2579 [RFC2579], 2580 [RFC2580], 2863 [RFC2863], 3411 [RFC3411], and 4001 [RFC4001]. It also refers to information in RFCs 792 [RFC792], 2463 [RFC2463], and 3413 [RFC3413].

```
NAT-MIB DEFINITIONS ::= BEGIN

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

```
             FROM SNMPv2-TC
     MODULE-COMPLIANCE,
     NOTIFICATION-GROUP,
     OBJECT-GROUP
             FROM SNMPv2-CONF
     ifIndex,
     ifCounterDiscontinuityGroup
             FROM IF-MIB
     SnmpAdminString
             FROM SNMP-FRAMEWORK-MIB
     InetAddressType,
     InetAddress,
     InetPortNumber
             FROM INET-ADDRESS-MIB;

natMIB MODULE-IDENTITY
     LAST-UPDATED "200503210000Z"
     ORGANIZATION "IETF Transport Area"
     CONTACT-INFO
              "
               Rohit
               Mascon Global Limited
               #59/2 100 ft Ring Road
               Banashankari II Stage
               Bangalore 560 070
               India
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               Information Security
               Bank One Corp
               1111 Polaris Pkwy
               Columbus, OH 43240
               Phone: +1 614 213 6117
               Email: cliffwang2000@yahoo.com
             "
     DESCRIPTION
             "This MIB module defines the generic managed objects
              for NAT.

              Copyright (C) The Internet Society (2005).  This version
              of this MIB module is part of RFC 4008;  see the RFC
              itself for full legal notices."
     REVISION     "200503210000Z"  -- 21th March 2005
     DESCRIPTION
             "Initial version, published as RFC 4008."
     ::= { mib-2 123 }

natMIBObjects OBJECT IDENTIFIER ::= { natMIB 1 }

NatProtocolType ::= TEXTUAL-CONVENTION
       STATUS       current
       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)
                  }

NatProtocolMap ::= TEXTUAL-CONVENTION
       STATUS       current
       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 current
       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 current
       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 current
       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 current
       DESCRIPTION
               "A unique id that is assigned to each session by
                a NAT enabled device."
       SYNTAX   Unsigned32 (1..4294967295)

NatBindMode ::= TEXTUAL-CONVENTION
       STATUS current
       DESCRIPTION
               "An indication of whether the bind is
                an address bind or an address port bind."
       SYNTAX   INTEGER {
                     addressBind (1),
                     addressPortBind (2)
                }

NatAssociationType ::= TEXTUAL-CONVENTION
       STATUS current
       DESCRIPTION
               "An indication of whether the association is
                static or dynamic."
       SYNTAX   INTEGER {
                     static (1),
                     dynamic (2)
                }

NatTranslationEntity ::= TEXTUAL-CONVENTION
       STATUS       current
       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)
    UNITS      "seconds"
    MAX-ACCESS read-write
    STATUS     current
    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)
    UNITS      "seconds"
    MAX-ACCESS read-write
    STATUS     current
    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)
    UNITS      "seconds"
    MAX-ACCESS read-write
    STATUS     current
    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)
    UNITS      "seconds"
    MAX-ACCESS read-write
    STATUS     current
    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
    SYNTAX     Unsigned32  (1..4294967295)
    UNITS      "seconds"
    MAX-ACCESS read-write
    STATUS     current
    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)
    UNITS      "seconds"
    MAX-ACCESS read-write
    STATUS     current
    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)
    UNITS       "seconds"
    MAX-ACCESS  read-write
    STATUS      current
    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
             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      current
    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      current
    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     current
    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      current
    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     current
    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
    STATUS     current
    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     current
    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
    STATUS      current
    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
    STATUS      current
    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
            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
    STATUS      current
    DESCRIPTION
            "This table lists address map parameters for NAT."
    ::= { natMIBObjects 4 }

natAddrMapEntry OBJECT-TYPE
    SYNTAX      NatAddrMapEntry
    MAX-ACCESS  not-accessible
    STATUS      current
    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."
    INDEX   { ifIndex, natAddrMapIndex }
    ::= { 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
    STATUS      current
    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      current
    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      current
    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      current
    DESCRIPTION
            "The end-point entity (source or destination) in
             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      current
    DESCRIPTION
            "This object specifies the address type used for
             natAddrMapLocalAddrFrom and natAddrMapLocalAddrTo."
    ::= { natAddrMapEntry 5 }

natAddrMapLocalAddrFrom OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
            "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      current
    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      current
    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      current
    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.

             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      current
    DESCRIPTION
            "This object specifies the address type used for
             natAddrMapGlobalAddrFrom and natAddrMapGlobalAddrTo."
    ::= { natAddrMapEntry 10 }

natAddrMapGlobalAddrFrom OBJECT-TYPE
    SYNTAX      InetAddress
    MAX-ACCESS  read-create
    STATUS      current
    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      current
    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 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      current
    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      current
    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      current
    DESCRIPTION
            "This object specifies a bitmap of protocol identifiers."
    ::= { natAddrMapEntry 15 }

natAddrMapInTranslates OBJECT-TYPE
    SYNTAX     Counter64
    MAX-ACCESS read-only
    STATUS     current
    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     current
    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     current
    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 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     current
    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      current
    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      current
    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 }

--
-- Address Bind section
--

natAddrBindNumberOfEntries OBJECT-TYPE
    SYNTAX     Gauge32
    MAX-ACCESS read-only
    STATUS     current
    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     current
    DESCRIPTION
            "This table holds information about the currently
             active NAT BINDs."
    ::= { natMIBObjects 6 }

natAddrBindEntry OBJECT-TYPE
    SYNTAX     NatAddrBindEntry
    MAX-ACCESS not-accessible
    STATUS     current
    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      current
    DESCRIPTION
            "This object specifies the address type used for
             natAddrBindLocalAddr."
    ::= { natAddrBindEntry 1 }

natAddrBindLocalAddr OBJECT-TYPE
    SYNTAX     InetAddress
    MAX-ACCESS not-accessible
    STATUS     current
    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      current
    DESCRIPTION
            "This object specifies the address type used for
             natAddrBindGlobalAddr."
    ::= { natAddrBindEntry 3 }

natAddrBindGlobalAddr OBJECT-TYPE
    SYNTAX     InetAddress
    MAX-ACCESS read-only
    STATUS     current
    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     current
    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     current
    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
    STATUS     current
    DESCRIPTION
            "This object indicates whether the bind is static or
             dynamic."
    ::= { natAddrBindEntry 7 }

natAddrBindMapIndex OBJECT-TYPE
    SYNTAX     NatAddrMapId
    MAX-ACCESS read-only
    STATUS     current
    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
    STATUS     current
    DESCRIPTION
            "Number of sessions currently using this BIND."
    ::= { natAddrBindEntry 9 }

natAddrBindMaxIdleTime OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    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     current
    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."
    ::= { natAddrBindEntry 11 }

natAddrBindInTranslates OBJECT-TYPE
    SYNTAX     Counter64
    MAX-ACCESS read-only
    STATUS     current
    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
        SYNTAX     Counter64
        MAX-ACCESS read-only
        STATUS     current
        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
        STATUS     current
        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     current
        DESCRIPTION
                "This table holds information about the currently
                active NAPT BINDs."
        ::= { natMIBObjects 8 }

    natAddrPortBindEntry OBJECT-TYPE
        SYNTAX     NatAddrPortBindEntry
        MAX-ACCESS not-accessible
        STATUS     current
        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
}

natAddrPortBindLocalAddrType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
            "This object specifies the address type used for
             natAddrPortBindLocalAddr."
    ::= { natAddrPortBindEntry 1 }

natAddrPortBindLocalAddr OBJECT-TYPE
    SYNTAX     InetAddress
    MAX-ACCESS not-accessible
    STATUS     current
    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     current
    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 RFC 792 for ICMPv4 and in RFC
             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 natAddrPortBindGlobalAddr)."
   ::= { natAddrPortBindEntry 3 }

natAddrPortBindProtocol OBJECT-TYPE
    SYNTAX      NatProtocolType
    MAX-ACCESS  not-accessible
    STATUS      current
    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
    SYNTAX      InetAddressType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "This object specifies the address type used for
             natAddrPortBindGlobalAddr."
    ::= { natAddrPortBindEntry 5 }

natAddrPortBindGlobalAddr OBJECT-TYPE
    SYNTAX     InetAddress
    MAX-ACCESS read-only
    STATUS     current
    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     current
    DESCRIPTION
            "For a protocol value TCP or UDP, this object represents
             the public-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 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     NatBindId
    MAX-ACCESS read-only
    STATUS     current
    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 unique bind id across both
             the natAddrBindTable and the natAddrPortBindTable."
    ::= { natAddrPortBindEntry 8 }

natAddrPortBindTranslationEntity OBJECT-TYPE
    SYNTAX     NatTranslationEntity
    MAX-ACCESS read-only
    STATUS     current
    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
             outboundSrcEndPoint and inboundDstEndPoint)."
    ::= { natAddrPortBindEntry 9 }

natAddrPortBindType OBJECT-TYPE
    SYNTAX     NatAssociationType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "This object indicates whether the bind is static or
             dynamic."
    ::= { natAddrPortBindEntry 10 }

natAddrPortBindMapIndex OBJECT-TYPE
    SYNTAX     NatAddrMapId
    MAX-ACCESS read-only
    STATUS     current
    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     current
    DESCRIPTION
            "Number of sessions currently using this BIND."
    ::= { natAddrPortBindEntry 12 }

natAddrPortBindMaxIdleTime OBJECT-TYPE
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current

    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
    SYNTAX     TimeTicks
    MAX-ACCESS read-only
    STATUS     current
    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     current
    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     current
    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     current
    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     current
    DESCRIPTION
            "An entry (conceptual row) containing information
             about an active NAT session on this NAT device.
             These entries are lost upon agent restart."
    INDEX   { ifIndex, natSessionIndex }
    ::= { 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     current
    DESCRIPTION
            "The session ID for this NAT session."
    ::= { natSessionEntry 1 }

natSessionPrivateSrcEPBindId OBJECT-TYPE
    SYNTAX     NatBindIdOrZero
    MAX-ACCESS read-only
    STATUS     current
    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     current
    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
    STATUS     current
    DESCRIPTION
            "The bind id associated between private and public
             destination end points."
    ::= { natSessionEntry 4 }

natSessionPrivateDstEPBindMode OBJECT-TYPE
    SYNTAX     NatBindMode
    MAX-ACCESS read-only
    STATUS     current
    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     current
    DESCRIPTION
            "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
    STATUS     current
    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     current
    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
    SYNTAX     NatProtocolType
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The protocol type of this session."
    ::= { natSessionEntry 9 }

natSessionPrivateAddrType OBJECT-TYPE
    SYNTAX      InetAddressType
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
            "This object specifies the address type used for
             natSessionPrivateSrcAddr and natSessionPrivateDstAddr."
    ::= { natSessionEntry 10 }

natSessionPrivateSrcAddr OBJECT-TYPE
    SYNTAX     InetAddress
    MAX-ACCESS read-only
    STATUS     current
    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
    STATUS     current
    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 RFC 792 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
    SYNTAX     InetAddress
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The destination IP address of the session endpoint that
             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
    STATUS     current
    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      current
    DESCRIPTION
            "This object specifies the address type used for
             natSessionPublicSrcAddr and natSessionPublicDstAddr."
    ::= { natSessionEntry 15 }

natSessionPublicSrcAddr OBJECT-TYPE
    SYNTAX     InetAddress
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "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     current
    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
    SYNTAX     InetAddress
    MAX-ACCESS read-only
    STATUS     current
    DESCRIPTION
            "The destination IP address of the session endpoint that
             lies in the public network.

             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
    SYNTAX     InetPortNumber
    MAX-ACCESS read-only
    STATUS     current
    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     current
    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     current
    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     current
    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     current
    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     current
    DESCRIPTION
            "The (conceptual) table containing per protocol NAT
             statistics."
    ::= { natMIBObjects 10 }

natProtocolEntry OBJECT-TYPE
    SYNTAX     NatProtocolEntry
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "An entry (conceptual row) containing NAT statistics
             pertaining to a particular protocol."
    INDEX   { natProtocol }
    ::= { natProtocolTable 1 }

NatProtocolEntry ::= SEQUENCE {
    natProtocol                 NatProtocolType,
    natProtocolInTranslates     Counter64,
    natProtocolOutTranslates    Counter64,
    natProtocolDiscards         Counter64
}
```

```
natProtocol    OBJECT-TYPE
    SYNTAX     NatProtocolType
    MAX-ACCESS not-accessible
    STATUS     current
    DESCRIPTION
            "This object represents the protocol pertaining to which
             parameters are reported."
    ::= { natProtocolEntry 1 }

natProtocolInTranslates OBJECT-TYPE
    SYNTAX     Counter64
    MAX-ACCESS read-only
    STATUS     current
    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     current
    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 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     current
    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  current
    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  current
    DESCRIPTION
            "A collection of configuration-related information
             required to support management of devices supporting
             NAT."
    ::= { natMIBGroups 1 }

natTranslationGroup OBJECT-GROUP
    OBJECTS { natAddrBindNumberOfEntries,
              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  current

    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  current
    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  current
    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  current
    DESCRIPTION
            "A collection of address map specific NAT statistics,
             to aid troubleshooting/monitoring of NAT operation."
    ::= { natMIBGroups 5 }

natMIBNotificationGroup NOTIFICATION-GROUP
    NOTIFICATIONS { natPacketDiscard }
    STATUS        current
    DESCRIPTION
            "A collection of notifications generated by
            devices supporting this MIB."
    ::= { natMIBGroups 6 }

--
-- Compliance statements
--

natMIBFullCompliance MODULE-COMPLIANCE
    STATUS  current
    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:
                 "
             -- 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
       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."


      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  current
    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:
             "
             -- 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
       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) }
       MIN-ACCESS   read-only
       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) }
       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  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."

      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."

      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
```

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7. Security Considerations

It is clear that this MIB can potentially be useful for configuration. Unauthorized access to the write-able objects could cause a denial of service and/or widespread network disturbance. Hence, the support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

At this writing, no security holes have been identified beyond those that SNMP Security is itself intended to address. These relate primarily to controlled access to sensitive information and the ability to configure a device - or which might result from operator error, which is beyond the scope of any security architecture.

There are a number of managed objects in this MIB that may contain information that may be sensitive from a business perspective, in that they may represent NAT bind and session information. The NAT bind and session objects reveal the identity of private hosts that are engaged in a session with external end nodes. A curious outsider could monitor these two objects to assess the number of private hosts being supported by the NAT device. Further, a disgruntled former employee of an enterprise could use the NAT bind and session information to break into specific private hosts by intercepting the existing sessions or originating new sessions into the host. There are no objects that are sensitive in their own right, such as passwords or monetary amounts. It may even be important to control GET access to these objects and possibly to encrypt the values of these objects when they are sent over the network via SNMP. Not all versions of SNMP provide features for such a secure environment.

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

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

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

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