Network Working Group
Request for Comments: 2465
Category: Standards Track

D. Haskin
S. Onishi
Bay Networks, Inc.

December 1998

Management Information Base for IP Version 6: Textual Conventions and General Group

Status of this Memo

Copyright Notice

Abstract

This document is one in the series of documents that provide MIB definitions for for IP Version 6. Specifically, the IPv6 MIB textual conventions as well as the IPv6 MIB General group is defined in this document.

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the IPv6-based internets.

This document specifies a MIB module in a manner that is both compliant to the SNMPv2 SMI, and semantically identical to the peer SNMPv1 definitions.

Table of Contents

1. The SNMPv2 Network Management Framework 2
1.1 Object Definitions 2
2. Overview 2
3. IPv6 Address Representation 3
4. Definition of Textual Conventions 4
5. The IPv6 General Group 5
6. Acknowledgments 36
7. References 36
8. Security Considerations 37
9. Authors' Addresses..... 37

10. Full Copyright Statement..... 38

1. The SNMPv2 Network Management Framework

The SNMPv2 Network Management Framework presently consists of three major components. They are:

- o the SMI, described in RFC 1902 [1] - the mechanisms used for describing and naming objects for the purpose of management.
- o the MIB-II, described in RFC 1213/STD 17 [3] - the core set of managed objects for the Internet suite of protocols.
- o RFC 1157/STD 15 [4] and RFC 1905 [5] which define two versions of the protocol used for network access to managed objects.

The Framework permits new objects to be defined for the purpose of experimentation and evaluation.

1.1. Object Definitions

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) defined in the SMI. In particular, each object type is named by an OBJECT IDENTIFIER, an administratively assigned name. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, we often use a textual string, termed the descriptor, to refer to the object type.

2. Overview

This document is the first in the series of documents that define various MIB object groups for IPv6. These groups are the basic unit of conformance: if the semantics of a group is applicable to an implementation, then it must implement all objects in that group. For example, an implementation must implement the TCP group if and only if it implements the TCP over IPv6 protocol. At minimum, implementations must implement the IPv6 General group defined in this document as well as the ICMPv6 group [9].

This document defines the IPv6 MIB textual conventions as well as the IPv6 General group which provides for the basic management of IPv6 entities and serve as the foundation for other IPv6 MIB definitions.

The IPv6 General group consists of 6 tables:

- ipv6IfTable

  The IPv6 Interfaces table contains information on the entity's IPv6 interfaces.

- ipv6IfStatsTable

  This table contains information on the traffic statistics of the entity's IPv6 interfaces.

- ipv6AddrPrefixTable

  The IPv6 Address Prefix table contains information on Address Prefixes that are associated with the entity's IPv6 interfaces.

- ipv6AddrTable

  This table contains the addressing information relevant to the entity's IPv6 interfaces.

- ipv6RouteTable

  The IPv6 routing table contains an entry for each valid IPv6 unicast route that can be used for packet forwarding determination.

- ipv6NetToMediaTable

  The IPv6 address translation table contain the IPv6 Address to 'physical' address equivalencies.

3. IPv6 Address Representation

The IPv6 MIB defined in this memo uses an OCTET STRING of length 16 to represent 128-bit IPv6 address in network byte- order. This approach allows to implement IPv6 MIB without requiring any changes to the SNMPv2 SMI and compliant SNMP implementations.

4. Definition of Textual Conventions

```
IPV6-TC DEFINITIONS ::= BEGIN

IMPORTS
     Integer32                FROM SNMPv2-SMI
     TEXTUAL-CONVENTION       FROM SNMPv2-TC;


-- definition of textual conventions
Ipv6Address ::= TEXTUAL-CONVENTION
     DISPLAY-HINT "2x:"
     STATUS       current
     DESCRIPTION
       "This data type is used to model IPv6 addresses.
        This is a binary string of 16 octets in network
        byte-order."
     SYNTAX       OCTET STRING (SIZE (16))

Ipv6AddressPrefix ::= TEXTUAL-CONVENTION
     DISPLAY-HINT "2x:"
     STATUS       current
     DESCRIPTION
       "This data type is used to model IPv6 address
       prefixes. This is a binary string of up to 16
       octets in network byte-order."
     SYNTAX       OCTET STRING (SIZE (0..16))

Ipv6AddressIfIdentifier ::= TEXTUAL-CONVENTION
     DISPLAY-HINT "2x:"
     STATUS       current
     DESCRIPTION
       "This data type is used to model IPv6 address
       interface identifiers. This is a binary string
        of up to 8 octets in network byte-order."
     SYNTAX      OCTET STRING (SIZE (0..8))

Ipv6IfIndex ::= TEXTUAL-CONVENTION
     DISPLAY-HINT "d"
     STATUS       current
     DESCRIPTION
       "A unique value, greater than zero for each
       internetwork-layer interface in the managed
       system. It is recommended that values are assigned
       contiguously starting from 1. The value for each
       internetwork-layer interface must remain constant
       at least from one re-initialization of the entity's
       network management system to the next
```

```
              re-initialization."
          SYNTAX       Integer32 (1..2147483647)

      Ipv6IfIndexOrZero ::= TEXTUAL-CONVENTION
          DISPLAY-HINT "d"
          STATUS       current
          DESCRIPTION
              "This textual convention is an extension of the
              Ipv6IfIndex convention.  The latter defines
              a greater than zero value used to identify an IPv6
              interface in the managed system.  This extension
              permits the additional value of zero.  The value
              zero is object-specific and must therefore be
              defined as part of the description of any object
              which uses this syntax.  Examples of the usage of
              zero might include situations where interface was
              unknown, or when none or all interfaces need to be
              referenced."
          SYNTAX       Integer32 (0..2147483647)

      END
```

5. The IPv6 General Group

```
      IPV6-MIB DEFINITIONS ::= BEGIN

      IMPORTS
          MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
          mib-2, Counter32, Unsigned32, Integer32,
          Gauge32                              FROM SNMPv2-SMI
          DisplayString, PhysAddress, TruthValue, TimeStamp,
          VariablePointer, RowPointer          FROM SNMPv2-TC
          MODULE-COMPLIANCE, OBJECT-GROUP,
          NOTIFICATION-GROUP                   FROM SNMPv2-CONF
          Ipv6IfIndex, Ipv6Address, Ipv6AddressPrefix,
          Ipv6AddressIfIdentifier,
          Ipv6IfIndexOrZero                    FROM IPV6-TC;

      ipv6MIB MODULE-IDENTITY
          LAST-UPDATED "9802052155Z"
          ORGANIZATION "IETF IPv6 Working Group"
          CONTACT-INFO
            "           Dimitry Haskin

                 Postal: Bay Networks, Inc.
                         660 Techology Park Drive.
                         Billerica, MA  01821
```

```
                        US

                   Tel: +1-978-916-8124
                E-mail: dhaskin@baynetworks.com

                        Steve Onishi

                Postal: Bay Networks, Inc.
                        3 Federal Street
                        Billerica, MA 01821
                        US

                   Tel: +1-978-916-3816
                E-mail: sonishi@baynetworks.com"
        DESCRIPTION
          "The MIB module for entities implementing the IPv6
           protocol."
        ::= { mib-2 55 }


    -- the IPv6 general group

    ipv6MIBObjects OBJECT IDENTIFIER   ::= { ipv6MIB 1 }


    ipv6Forwarding OBJECT-TYPE
        SYNTAX      INTEGER {
                     forwarding(1),    -- acting as a router

                                       -- NOT acting as
                     notForwarding(2)  -- a router
                    }
         MAX-ACCESS read-write
         STATUS     current
         DESCRIPTION
           "The indication of whether this entity is acting
           as an IPv6 router in respect to the forwarding of
           datagrams received by, but not addressed to, this
           entity.  IPv6 routers forward datagrams.  IPv6
           hosts do not (except those source-routed via the
           host).

           Note that for some managed nodes, this object may
           take on only a subset of the values possible.
           Accordingly, it is appropriate for an agent to
           return a 'wrongValue' response if a management
           station attempts to change this object to an
           inappropriate value."
```

```
          ::= { ipv6MIBObjects 1 }

      ipv6DefaultHopLimit OBJECT-TYPE
          SYNTAX      INTEGER(0..255)
          MAX-ACCESS  read-write
           STATUS     current
          DESCRIPTION
             "The default value inserted into the Hop Limit
             field of the IPv6 header of datagrams originated
             at this entity, whenever a Hop Limit value is not
             supplied by the transport layer protocol."
          DEFVAL  { 64 }
          ::= { ipv6MIBObjects 2 }

      ipv6Interfaces OBJECT-TYPE
          SYNTAX      Unsigned32
          MAX-ACCESS  read-only
          STATUS      current
          DESCRIPTION
            "The number of IPv6 interfaces (regardless of
             their current state) present on this system."
          ::= { ipv6MIBObjects 3 }

      ipv6IfTableLastChange OBJECT-TYPE
          SYNTAX      TimeStamp
          MAX-ACCESS  read-only
          STATUS      current
          DESCRIPTION
            "The value of sysUpTime at the time of the last
            insertion or removal of an entry in the
            ipv6IfTable. If the number of entries has been
            unchanged since the last re-initialization of
            the local network management subsystem, then this
            object contains a zero value."
          ::= { ipv6MIBObjects 4 }


      -- the IPv6 Interfaces table

      ipv6IfTable OBJECT-TYPE
          SYNTAX     SEQUENCE OF Ipv6IfEntry
          MAX-ACCESS not-accessible
          STATUS     current
          DESCRIPTION
            "The IPv6 Interfaces table contains information
            on the entity's internetwork-layer interfaces.
            An IPv6 interface constitutes a logical network
            layer attachment to the layer immediately below
```

```
          IPv6 including internet layer 'tunnels', such as
          tunnels over IPv4 or IPv6 itself."
        ::= { ipv6MIBObjects 5 }

    ipv6IfEntry OBJECT-TYPE
        SYNTAX     Ipv6IfEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
          "An interface entry containing objects
           about a particular IPv6 interface."
        INDEX   { ipv6IfIndex }
        ::= { ipv6IfTable 1 }

    Ipv6IfEntry ::= SEQUENCE {
            ipv6IfIndex              Ipv6IfIndex,
            ipv6IfDescr              DisplayString,
            ipv6IfLowerLayer         VariablePointer,
            ipv6IfEffectiveMtu       Unsigned32,
            ipv6IfReasmMaxSize       Unsigned32,
            ipv6IfIdentifier         Ipv6AddressIfIdentifier,
            ipv6IfIdentifierLength   INTEGER,
            ipv6IfPhysicalAddress    PhysAddress,
            ipv6IfAdminStatus        INTEGER,
            ipv6IfOperStatus         INTEGER,
            ipv6IfLastChange         TimeStamp
        }

    ipv6IfIndex OBJECT-TYPE
        SYNTAX     Ipv6IfIndex
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
          "A unique non-zero value identifying
           the particular IPv6 interface."
        ::= { ipv6IfEntry 1 }

    ipv6IfDescr OBJECT-TYPE
        SYNTAX     DisplayString
        MAX-ACCESS read-write
        STATUS     current
        DESCRIPTION
          "A textual string containing information about the
          interface.  This string may be set by the network
          management system."
        ::= { ipv6IfEntry 2 }

    ipv6IfLowerLayer OBJECT-TYPE
```

```
      SYNTAX      VariablePointer
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "This object identifies the protocol layer over
         which this network interface operates.  If this
         network interface operates over the data-link
         layer, then the value of this object refers to an
         instance of ifIndex [6]. If this network interface
         operates over an IPv4 interface, the value of this
         object refers to an instance of ipAdEntAddr [3].

         If this network interface operates over another
         IPv6 interface, the value of this object refers to
         an instance of ipv6IfIndex.  If this network
         interface is not currently operating over an active
         protocol layer, then the value of this object
         should be set to the OBJECT ID { 0 0 }."
      ::= { ipv6IfEntry 3 }

   ipv6IfEffectiveMtu OBJECT-TYPE
      SYNTAX      Unsigned32
      UNITS       "octets"
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "The size of the largest IPv6 packet which can be
        sent/received on the interface, specified in
        octets."
   ::= { ipv6IfEntry 4 }

   ipv6IfReasmMaxSize OBJECT-TYPE
      SYNTAX      Unsigned32 (0..65535)
      UNITS       "octets"
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "The size of the largest IPv6 datagram which this
        entity can re-assemble from incoming IPv6 fragmented
        datagrams received on this interface."
   ::= { ipv6IfEntry 5 }

   ipv6IfIdentifier OBJECT-TYPE
       SYNTAX      Ipv6AddressIfIdentifier
       MAX-ACCESS  read-write
       STATUS      current
       DESCRIPTION
          "The Interface Identifier for this interface that
```

```
            is (at least) unique on the link this interface is
            attached to. The Interface Identifier is combined
            with an address prefix to form an interface address.

            By default, the Interface Identifier is autoconfigured
            according to the rules of the link type this
            interface is attached to."
        ::= { ipv6IfEntry 6 }

    ipv6IfIdentifierLength OBJECT-TYPE
        SYNTAX      INTEGER (0..64)
        UNITS       "bits"
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
          "The length of the Interface Identifier in bits."
        ::= { ipv6IfEntry 7 }

    ipv6IfPhysicalAddress OBJECT-TYPE
        SYNTAX      PhysAddress
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
          "The interface's physical address. For example, for
          an IPv6 interface attached to an 802.x link, this
          object normally contains a MAC address. Note that
          in some cases this address may differ from the
          address of the interface's protocol sub-layer.  The
          interface's media-specific MIB must define the bit
          and byte ordering and the format of the value of
          this object. For interfaces which do not have such
          an address (e.g., a serial line), this object should
          contain an octet string of zero length."
        ::= { ipv6IfEntry 8 }

    ipv6IfAdminStatus OBJECT-TYPE
        SYNTAX  INTEGER {
                  up(1),       -- ready to pass packets
                  down(2)
                }
        MAX-ACCESS  read-write
        STATUS      current
        DESCRIPTION
          "The desired state of the interface.  When a managed
          system initializes,  all IPv6 interfaces start with
          ipv6IfAdminStatus in the down(2) state.  As a result
          of either explicit management action or per
          configuration information retained by the managed
```

```
            system,  ipv6IfAdminStatus is then changed to
            the up(1) state (or remains in the down(2) state)."
        ::= { ipv6IfEntry 9 }

    ipv6IfOperStatus OBJECT-TYPE
        SYNTAX  INTEGER {
                  up(1),             -- ready to pass packets

                  down(2),

                  noIfIdentifier(3), -- no interface identifier

                                     -- status can not be
                                     -- determined for some
                  unknown(4),        -- reason

                                     -- some component is
                  notPresent(5)      -- missing
                }
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
          "The current operational state of the interface.
          The noIfIdentifier(3) state indicates that no valid
          Interface Identifier is assigned to the interface.
          This state usually indicates that the link-local
          interface address failed Duplicate Address Detection.
          If ipv6IfAdminStatus is down(2) then ipv6IfOperStatus
          should be down(2).  If ipv6IfAdminStatus is changed
          to up(1) then ipv6IfOperStatus should change to up(1)
          if the interface is ready to transmit and receive
          network traffic; it should remain in the down(2) or
          noIfIdentifier(3) state if and only if there is a
          fault that prevents it from going to the up(1) state;
          it should remain in the notPresent(5) state if
          the interface has missing (typically, lower layer)
          components."
        ::= { ipv6IfEntry 10 }

    ipv6IfLastChange OBJECT-TYPE
        SYNTAX      TimeStamp
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
            "The value of sysUpTime at the time the interface
            entered its current operational state.  If the
            current state was entered prior to the last
            re-initialization of the local network management
```

```
            subsystem, then this object contains a zero
            value."
        ::= { ipv6IfEntry 11 }

    --  IPv6 Interface Statistics table

    ipv6IfStatsTable OBJECT-TYPE
        SYNTAX     SEQUENCE OF Ipv6IfStatsEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
            "IPv6 interface traffic statistics."
        ::= { ipv6MIBObjects 6 }

    ipv6IfStatsEntry OBJECT-TYPE
        SYNTAX     Ipv6IfStatsEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
            "An interface statistics entry containing objects
            at a particular IPv6 interface."
        AUGMENTS { ipv6IfEntry }
        ::= { ipv6IfStatsTable 1 }

    Ipv6IfStatsEntry ::= SEQUENCE {
            ipv6IfStatsInReceives
                Counter32,
            ipv6IfStatsInHdrErrors
                Counter32,
            ipv6IfStatsInTooBigErrors
                Counter32,
            ipv6IfStatsInNoRoutes
                Counter32,
            ipv6IfStatsInAddrErrors
                Counter32,
            ipv6IfStatsInUnknownProtos
                Counter32,
            ipv6IfStatsInTruncatedPkts
                Counter32,
            ipv6IfStatsInDiscards
                Counter32,
            ipv6IfStatsInDelivers
                Counter32,
            ipv6IfStatsOutForwDatagrams
                Counter32,
            ipv6IfStatsOutRequests
                Counter32,
            ipv6IfStatsOutDiscards
```

```
                Counter32,
            ipv6IfStatsOutFragOKs
                Counter32,
            ipv6IfStatsOutFragFails
                Counter32,
            ipv6IfStatsOutFragCreates
                Counter32,
            ipv6IfStatsReasmReqds
                Counter32,
            ipv6IfStatsReasmOKs
                Counter32,
            ipv6IfStatsReasmFails
                Counter32,
            ipv6IfStatsInMcastPkts
                Counter32,
            ipv6IfStatsOutMcastPkts
                Counter32
        }

    ipv6IfStatsInReceives OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
           "The total number of input datagrams received by
           the interface, including those received in error."
        ::= { ipv6IfStatsEntry 1 }

    ipv6IfStatsInHdrErrors OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
           "The number of input datagrams discarded due to
           errors in their IPv6 headers, including version
           number mismatch, other format errors, hop count
           exceeded, errors discovered in processing their
           IPv6 options, etc."
        ::= { ipv6IfStatsEntry 2 }

    ipv6IfStatsInTooBigErrors OBJECT-TYPE
        SYNTAX      Counter32
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
          "The number of input datagrams that could not be
          forwarded because their size exceeded the link MTU
          of outgoing interface."
```

```
            ::= { ipv6IfStatsEntry 3 }

        ipv6IfStatsInNoRoutes OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
               "The number of input datagrams discarded because no
                route could be found to transmit them to their
                destination."
            ::= { ipv6IfStatsEntry 4 }

        ipv6IfStatsInAddrErrors OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
               "The number of input datagrams discarded because
               the IPv6 address in their IPv6 header's destination
               field was not a valid address to be received at
               this entity.  This count includes invalid
               addresses (e.g., ::0) and unsupported addresses
               (e.g., addresses with unallocated prefixes).  For
               entities which are not IPv6 routers and therefore
               do not forward datagrams, this counter includes
               datagrams discarded because the destination address
               was not a local address."
            ::= { ipv6IfStatsEntry 5 }

        ipv6IfStatsInUnknownProtos OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
               "The number of locally-addressed datagrams
               received successfully but discarded because of an
               unknown or unsupported protocol. This counter is
               incremented at the interface to which these
               datagrams were addressed which might not be
               necessarily the input interface for some of
               the datagrams."
            ::= { ipv6IfStatsEntry 6 }


        ipv6IfStatsInTruncatedPkts OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
```

```
            DESCRIPTION
               "The number of input datagrams discarded because
                datagram frame didn't carry enough data."
            ::= { ipv6IfStatsEntry 7 }

        ipv6IfStatsInDiscards OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
               "The number of input IPv6 datagrams for which no
               problems were encountered to prevent their
               continued processing, but which were discarded
               (e.g., for lack of buffer space).  Note that this
               counter does not include any datagrams discarded
               while awaiting re-assembly."
            ::= { ipv6IfStatsEntry 8 }

        ipv6IfStatsInDelivers OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
             "The total number of datagrams successfully
             delivered to IPv6 user-protocols (including ICMP).
             This counter is incremented at the interface to
             which these datagrams were addressed which might
             not be necessarily the input interface for some of
             the datagrams."
            ::= { ipv6IfStatsEntry 9 }

        ipv6IfStatsOutForwDatagrams OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
               "The number of output datagrams which this
               entity received and forwarded to their final
               destinations.  In entities which do not act
               as IPv6 routers, this counter will include
               only those packets which were Source-Routed
               via this entity, and the Source-Route
               processing was successful.  Note that for
               a successfully forwarded datagram the counter
               of the outgoing interface is incremented."
            ::= { ipv6IfStatsEntry 10 }

        ipv6IfStatsOutRequests OBJECT-TYPE
```

```
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
             "The total number of IPv6 datagrams which local IPv6
             user-protocols (including ICMP) supplied to IPv6 in
             requests for transmission.  Note that this counter
             does not include any datagrams counted in
             ipv6IfStatsOutForwDatagrams."
            ::= { ipv6IfStatsEntry 11 }

        ipv6IfStatsOutDiscards OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
                "The number of output IPv6 datagrams for which no
                problem was encountered to prevent their
                transmission to their destination, but which were
                discarded (e.g., for lack of buffer space).  Note
                that this counter would include datagrams counted
                in ipv6IfStatsOutForwDatagrams if any such packets
                met this (discretionary) discard criterion."
            ::= { ipv6IfStatsEntry 12 }

        ipv6IfStatsOutFragOKs OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
               "The number of IPv6 datagrams that have been
                successfully fragmented at this output interface."
            ::= { ipv6IfStatsEntry 13 }

        ipv6IfStatsOutFragFails OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
               "The number of IPv6 datagrams that have been
                discarded because they needed to be fragmented
                at this output interface but could not be."
            ::= { ipv6IfStatsEntry 14 }

        ipv6IfStatsOutFragCreates OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
```

```
            DESCRIPTION
               "The number of output datagram fragments that have
                been generated as a result of fragmentation at
                this output interface."
            ::= { ipv6IfStatsEntry 15 }

        ipv6IfStatsReasmReqds OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
               "The number of IPv6 fragments received which needed
                to be reassembled at this interface.  Note that this
                counter is incremented at the interface to which
                these fragments were addressed which might not
                be necessarily the input interface for some of
                the fragments."
            ::= { ipv6IfStatsEntry 16 }

        ipv6IfStatsReasmOKs OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
              "The number of IPv6 datagrams successfully
              reassembled.  Note that this counter is incremented
              at the interface to which these datagrams were
              addressed which might not be necessarily the input
              interface for some of the fragments."
            ::= { ipv6IfStatsEntry 17 }

        ipv6IfStatsReasmFails OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
               "The number of failures detected by the IPv6 re-
               assembly algorithm (for whatever reason: timed
               out, errors, etc.).  Note that this is not
               necessarily a count of discarded IPv6 fragments
               since some algorithms (notably the algorithm in
               RFC 815) can lose track of the number of fragments
               by combining them as they are received.
               This counter is incremented at the interface to which
               these fragments were addressed which might not be
               necessarily the input interface for some of the
               fragments."
            ::= { ipv6IfStatsEntry 18 }
```

```
        ipv6IfStatsInMcastPkts OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS     current
            DESCRIPTION
               "The number of multicast packets received
                by the interface"
            ::= { ipv6IfStatsEntry 19 }

        ipv6IfStatsOutMcastPkts OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
               "The number of multicast packets transmitted
                by the interface"
            ::= { ipv6IfStatsEntry 20 }



        -- Address Prefix table

        -- The IPv6 Address Prefix table contains information on
        -- the entity's IPv6 Address Prefixes that are associated
        -- with IPv6 interfaces.

        ipv6AddrPrefixTable OBJECT-TYPE
            SYNTAX  SEQUENCE OF Ipv6AddrPrefixEntry
            MAX-ACCESS  not-accessible
            STATUS      current
            DESCRIPTION
                "The list of IPv6 address prefixes of
                IPv6 interfaces."
            ::= { ipv6MIBObjects 7 }

        ipv6AddrPrefixEntry OBJECT-TYPE
            SYNTAX  Ipv6AddrPrefixEntry
            MAX-ACCESS  not-accessible
            STATUS      current
            DESCRIPTION
                "An interface entry containing objects of
                a particular IPv6 address prefix."
            INDEX   { ipv6IfIndex,
                      ipv6AddrPrefix,
                      ipv6AddrPrefixLength }
            ::= { ipv6AddrPrefixTable 1 }

        Ipv6AddrPrefixEntry ::= SEQUENCE {
```

```
        ipv6AddrPrefix                     Ipv6AddressPrefix,
        ipv6AddrPrefixLength               INTEGER (0..128),
        ipv6AddrPrefixOnLinkFlag           TruthValue,
        ipv6AddrPrefixAutonomousFlag       TruthValue,
        ipv6AddrPrefixAdvPreferredLifetime Unsigned32,
        ipv6AddrPrefixAdvValidLifetime     Unsigned32
       }

    ipv6AddrPrefix OBJECT-TYPE
        SYNTAX      Ipv6AddressPrefix
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
          "The prefix associated with the this interface."
        ::= { ipv6AddrPrefixEntry 1 }

    ipv6AddrPrefixLength OBJECT-TYPE
        SYNTAX      INTEGER (0..128)
        UNITS       "bits"
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
          "The length of the prefix (in bits)."
        ::= { ipv6AddrPrefixEntry 2 }

    ipv6AddrPrefixOnLinkFlag OBJECT-TYPE
        SYNTAX      TruthValue
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
          "This object has the value 'true(1)', if this
          prefix can be used  for on-link determination
          and the value 'false(2)' otherwise."
        ::= { ipv6AddrPrefixEntry 3 }

    ipv6AddrPrefixAutonomousFlag OBJECT-TYPE
        SYNTAX      TruthValue
        MAX-ACCESS  read-only
        STATUS      current
        DESCRIPTION
          "Autonomous address configuration flag. When
          true(1), indicates that this prefix can be used
          for autonomous address configuration (i.e. can
          be used to form a local interface address).
          If false(2), it is not used to autoconfigure
          a local interface address."
        ::= { ipv6AddrPrefixEntry 4 }
```

```
        ipv6AddrPrefixAdvPreferredLifetime OBJECT-TYPE
            SYNTAX      Unsigned32
            UNITS       "seconds"
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
               "It is the length of time in seconds that this
               prefix will remain preferred, i.e. time until
               deprecation.  A value of 4,294,967,295 represents
               infinity.

               The address generated from a deprecated prefix
               should no longer be used as a source address in
               new communications, but packets received on such
               an interface are processed as expected."
            ::= { ipv6AddrPrefixEntry 5 }

        ipv6AddrPrefixAdvValidLifetime OBJECT-TYPE
            SYNTAX      Unsigned32
            UNITS       "seconds"
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
              "It is the length of time in seconds that this
              prefix will remain valid, i.e. time until
              invalidation.  A value of 4,294,967,295 represents
              infinity.

              The address generated from an invalidated prefix
              should not appear as the destination or source
              address of a packet."
            ::= { ipv6AddrPrefixEntry 6 }


        -- the IPv6 Address table

        -- The IPv6 address table contains this node's IPv6
        -- addressing information.

        ipv6AddrTable OBJECT-TYPE
           SYNTAX      SEQUENCE OF Ipv6AddrEntry
           MAX-ACCESS  not-accessible
           STATUS      current
           DESCRIPTION
             "The table of addressing information relevant to
             this node's interface addresses."
           ::= { ipv6MIBObjects 8 }
```

```
        ipv6AddrEntry OBJECT-TYPE
           SYNTAX      Ipv6AddrEntry
           MAX-ACCESS  not-accessible
           STATUS      current
           DESCRIPTION
               "The addressing information for one of this
               node's interface addresses."
           INDEX   { ipv6IfIndex, ipv6AddrAddress }
           ::= { ipv6AddrTable 1 }

        Ipv6AddrEntry ::=
           SEQUENCE {
                ipv6AddrAddress        Ipv6Address,
                ipv6AddrPfxLength      INTEGER,
                ipv6AddrType           INTEGER,
                ipv6AddrAnycastFlag    TruthValue,
                ipv6AddrStatus         INTEGER
               }

        ipv6AddrAddress OBJECT-TYPE
           SYNTAX      Ipv6Address
           MAX-ACCESS  not-accessible
           STATUS      current
           DESCRIPTION
             "The IPv6 address to which this entry's addressing
             information pertains."
           ::= { ipv6AddrEntry 1 }

        ipv6AddrPfxLength OBJECT-TYPE
           SYNTAX      INTEGER(0..128)
           UNITS       "bits"
           MAX-ACCESS  read-only
           STATUS      current
           DESCRIPTION
             "The length of the prefix (in bits) associated with
             the IPv6 address of this entry."
           ::= { ipv6AddrEntry 2 }

        ipv6AddrType OBJECT-TYPE
           SYNTAX      INTEGER {
                               -- address has been formed
                               -- using stateless
                stateless(1),  -- autoconfiguration

                               -- address has been acquired
                               -- by stateful means
                               -- (e.g. DHCPv6, manual
                stateful(2),   -- configuration)
```

```
                        -- type can not be determined
            unknown(3)  -- for some reason.
          }
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
         "The type of address. Note that 'stateless(1)'
         refers to an address that was statelessly
         autoconfigured; 'stateful(2)' refers to a address
         which was acquired by via a stateful protocol
         (e.g. DHCPv6, manual configuration)."
      ::= { ipv6AddrEntry 3 }

   ipv6AddrAnycastFlag OBJECT-TYPE
       SYNTAX      TruthValue
       MAX-ACCESS  read-only
       STATUS      current
       DESCRIPTION
         "This object has the value 'true(1)', if this
         address is an anycast address and the value
         'false(2)' otherwise."
       ::= { ipv6AddrEntry 4 }

   ipv6AddrStatus OBJECT-TYPE
      SYNTAX      INTEGER {
                preferred(1),

                deprecated(2),

                invalid(3),

                inaccessible(4),

                unknown(5)   -- status can not be determined
                             -- for some reason.
               }
      MAX-ACCESS  read-only
      STATUS      current
      DESCRIPTION
        "Address status.  The preferred(1) state indicates
        that this is a valid address that can appear as
        the destination or source address of a packet.
        The deprecated(2) state indicates that this is
        a valid but deprecated address that should no longer
        be used as a source address in new communications,
        but packets addressed to such an address are
        processed as expected. The invalid(3) state indicates
        that this is not valid address which should not
```

```
             appear as the destination or source address of
             a packet. The inaccessible(4) state indicates that
             the address is not accessible because the interface
             to which this address is assigned is not operational."
           ::= { ipv6AddrEntry 5 }


        -- IPv6 Routing objects

        ipv6RouteNumber OBJECT-TYPE
            SYNTAX      Gauge32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
              "The number of current ipv6RouteTable entries.
              This is primarily to avoid having to read
              the table in order to determine this number."
            ::= { ipv6MIBObjects 9 }

        ipv6DiscardedRoutes OBJECT-TYPE
            SYNTAX      Counter32
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
              "The number of routing entries which were chosen
               to be discarded even though they are valid.  One
               possible reason for discarding such an entry could
               be to free-up buffer space for other routing
               entries."
            ::= { ipv6MIBObjects 10 }


        -- IPv6 Routing table

        ipv6RouteTable OBJECT-TYPE
            SYNTAX     SEQUENCE OF Ipv6RouteEntry
            MAX-ACCESS not-accessible
            STATUS     current
            DESCRIPTION
              "IPv6 Routing table. This table contains
              an entry for each valid IPv6 unicast route
              that can be used for packet forwarding
              determination."
            ::= { ipv6MIBObjects 11 }

        ipv6RouteEntry OBJECT-TYPE
            SYNTAX     Ipv6RouteEntry
            MAX-ACCESS not-accessible
```

```
        STATUS     current
        DESCRIPTION
                "A routing entry."
        INDEX   { ipv6RouteDest,
                  ipv6RoutePfxLength,
                  ipv6RouteIndex }
        ::= { ipv6RouteTable 1 }

    Ipv6RouteEntry ::= SEQUENCE {
            ipv6RouteDest           Ipv6Address,
            ipv6RoutePfxLength      INTEGER,
            ipv6RouteIndex          Unsigned32,
            ipv6RouteIfIndex        Ipv6IfIndexOrZero,
            ipv6RouteNextHop        Ipv6Address,
            ipv6RouteType           INTEGER,
            ipv6RouteProtocol       INTEGER,
            ipv6RoutePolicy         Integer32,
            ipv6RouteAge            Unsigned32,
            ipv6RouteNextHopRDI     Unsigned32,
            ipv6RouteMetric         Unsigned32,
            ipv6RouteWeight         Unsigned32,
            ipv6RouteInfo           RowPointer,
            ipv6RouteValid          TruthValue
        }

    ipv6RouteDest OBJECT-TYPE
        SYNTAX     Ipv6Address
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
          "The destination IPv6 address of this route.
          This object may not take a Multicast address
          value."
        ::= { ipv6RouteEntry 1 }

    ipv6RoutePfxLength OBJECT-TYPE
        SYNTAX     INTEGER(0..128)
        UNITS      "bits"
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
          "Indicates the prefix length of the destination
          address."
        ::= { ipv6RouteEntry 2 }

    ipv6RouteIndex OBJECT-TYPE
        SYNTAX     Unsigned32
        MAX-ACCESS not-accessible
```

```
            STATUS     current
            DESCRIPTION
              "The value which uniquely identifies the route
              among the routes to the same network layer
              destination.  The way this value is chosen is
              implementation specific but it must be unique for
              ipv6RouteDest/ipv6RoutePfxLength pair and remain
              constant for the life of the route."
            ::= { ipv6RouteEntry 3 }

        ipv6RouteIfIndex OBJECT-TYPE
            SYNTAX     Ipv6IfIndexOrZero
            MAX-ACCESS read-only
            STATUS     current
            DESCRIPTION
              "The index value which uniquely identifies the local
              interface through which the next hop of this
              route should be reached.  The interface identified
              by a particular value of this index is the same
              interface as identified by the same value of
              ipv6IfIndex.  For routes of the discard type this
              value can be zero."
            ::= { ipv6RouteEntry 4 }

        ipv6RouteNextHop OBJECT-TYPE
            SYNTAX     Ipv6Address
            MAX-ACCESS read-only
            STATUS     current
            DESCRIPTION
              "On remote routes, the address of the next
              system en route;  otherwise, ::0
              ('00000000000000000000000000000000'H in ASN.1
              string representation)."
            ::= { ipv6RouteEntry 5 }

        ipv6RouteType OBJECT-TYPE
            SYNTAX     INTEGER {
               other(1),     -- none of the following

                             -- an route indicating that
                             -- packets to destinations
                             -- matching this route are
               discard(2),   -- to be discarded

                             -- route to directly
               local(3),     -- connected (sub-)network

                             -- route to a remote
```

```
            remote(4)     -- destination

        }
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
           "The type of route. Note that 'local(3)' refers
           to a route for which the next hop is the final
           destination; 'remote(4)' refers to a route for
           which  the  next  hop is not the final
           destination; 'discard(2)' refers to a route
           indicating that packets to destinations matching
           this route are to be discarded (sometimes called
           black-hole route)."
        ::= { ipv6RouteEntry 6 }

    ipv6RouteProtocol OBJECT-TYPE
        SYNTAX     INTEGER {
          other(1),   -- none of the following

                      -- non-protocol information,
                      -- e.g., manually configured
          local(2),   -- entries

          netmgmt(3), -- static route

                      -- obtained via Neighbor
                      -- Discovery protocol,
          ndisc(4),   -- e.g., result of Redirect

                      -- the following are all
                      -- dynamic routing protocols
          rip(5),     -- RIPng
          ospf(6),    -- Open Shortest Path First
          bgp(7),     -- Border Gateway Protocol
          idrp(8),    -- InterDomain Routing Protocol
          igrp(9)     -- InterGateway Routing Protocol
        }
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
          "The routing mechanism via which this route was
          learned."
        ::= { ipv6RouteEntry 7 }

    ipv6RoutePolicy OBJECT-TYPE
        SYNTAX     Integer32
        MAX-ACCESS read-only
```

```
            STATUS     current
            DESCRIPTION
             "The general set of conditions that would cause the
             selection of one multipath route (set of next hops
             for a given destination) is referred to as 'policy'.
             Unless the mechanism indicated by ipv6RouteProtocol
             specified otherwise, the policy specifier is the
             8-bit Traffic Class field of the IPv6 packet header
             that is zero extended at the left to a 32-bit value.

             Protocols defining 'policy' otherwise must either
             define a set of values which are valid for
             this object or must implement an integer-
             instanced  policy table for which this object's
             value acts as an index."
            ::= { ipv6RouteEntry 8 }

        ipv6RouteAge OBJECT-TYPE
            SYNTAX     Unsigned32
            UNITS      "seconds"
            MAX-ACCESS read-only
            STATUS     current
            DESCRIPTION
               "The number of seconds since this route was last
               updated or otherwise determined to be correct.
               Note that no semantics of 'too old' can be implied
               except through knowledge of the routing protocol
               by which the route was learned."
            ::= { ipv6RouteEntry 9 }

        ipv6RouteNextHopRDI OBJECT-TYPE
            SYNTAX     Unsigned32
            MAX-ACCESS read-only
            STATUS     current
            DESCRIPTION
               "The Routing Domain ID of the Next Hop.
               The  semantics of this object are determined by
               the routing-protocol specified in  the  route's
               ipv6RouteProtocol value.   When  this object is
               unknown or not relevant its value should be set
               to zero."
            ::= { ipv6RouteEntry 10 }

        ipv6RouteMetric OBJECT-TYPE
            SYNTAX     Unsigned32
            MAX-ACCESS read-only
            STATUS     current
            DESCRIPTION
```

```
            "The routing metric for this route. The
            semantics of this metric are determined by the
            routing protocol specified in the route's
            ipv6RouteProtocol value.  When this is unknown
            or not relevant to the protocol indicated by
            ipv6RouteProtocol, the object value should be
            set to its maximum value (4,294,967,295)."
        ::= { ipv6RouteEntry 11 }

    ipv6RouteWeight OBJECT-TYPE
        SYNTAX     Unsigned32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "The system internal weight value for this route.
            The semantics of this value are determined by
            the implementation specific rules. Generally,
            within routes with the same ipv6RoutePolicy value,
            the lower the weight value the more preferred is
            the route."
        ::= { ipv6RouteEntry 12 }

    ipv6RouteInfo OBJECT-TYPE
        SYNTAX     RowPointer
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
            "A reference to MIB definitions specific to the
            particular routing protocol which is responsible
            for this route, as determined by the  value
            specified  in the route's ipv6RouteProto value.
            If this information is not present,  its  value
            should be set to the OBJECT ID { 0 0 },
            which is a syntactically valid object  identifier,
            and any implementation conforming to ASN.1
            and the Basic Encoding Rules must  be  able  to
            generate and recognize this value."
        ::= { ipv6RouteEntry 13 }

    ipv6RouteValid OBJECT-TYPE
        SYNTAX     TruthValue
        MAX-ACCESS read-write
        STATUS     current
        DESCRIPTION
            "Setting this object to the value 'false(2)' has
            the effect of invalidating the corresponding entry
            in the ipv6RouteTable object.  That is, it
            effectively disassociates the destination
```

```
            identified with said entry from the route
            identified with said entry.  It is an
            implementation-specific matter as to whether the
            agent removes an invalidated entry from the table.
            Accordingly, management stations must be prepared
            to receive tabular information from agents that
            corresponds to entries not currently in use.
            Proper interpretation of such entries requires
            examination of the relevant ipv6RouteValid
            object."
        DEFVAL  { true }
        ::= { ipv6RouteEntry 14 }


    -- IPv6 Address Translation table

    ipv6NetToMediaTable OBJECT-TYPE
        SYNTAX      SEQUENCE OF Ipv6NetToMediaEntry
        MAX-ACCESS  not-accessible
        STATUS      current
        DESCRIPTION
          "The IPv6 Address Translation table used for
          mapping from IPv6 addresses to physical addresses.

          The IPv6 address translation table contain the
          Ipv6Address to 'physical' address equivalencies.
          Some interfaces do not use translation tables
          for determining address equivalencies; if all
          interfaces are of this type, then the Address
          Translation table is empty, i.e., has zero
          entries."
        ::= { ipv6MIBObjects 12 }

    ipv6NetToMediaEntry OBJECT-TYPE
        SYNTAX     Ipv6NetToMediaEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
          "Each entry contains one IPv6 address to 'physical'
          address equivalence."
        INDEX   { ipv6IfIndex,
                  ipv6NetToMediaNetAddress }
        ::= { ipv6NetToMediaTable 1 }

    Ipv6NetToMediaEntry ::= SEQUENCE {
            ipv6NetToMediaNetAddress
                Ipv6Address,
            ipv6NetToMediaPhysAddress
```

```
                PhysAddress,
            ipv6NetToMediaType
                INTEGER,
            ipv6IfNetToMediaState
                INTEGER,
            ipv6IfNetToMediaLastUpdated
                TimeStamp,
            ipv6NetToMediaValid
                TruthValue
        }

    ipv6NetToMediaNetAddress OBJECT-TYPE
        SYNTAX     Ipv6Address
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
           "The IPv6 Address corresponding to
           the media-dependent 'physical' address."
        ::= { ipv6NetToMediaEntry 1 }

    ipv6NetToMediaPhysAddress OBJECT-TYPE
        SYNTAX     PhysAddress
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
          "The media-dependent 'physical' address."
        ::= { ipv6NetToMediaEntry 2 }

    ipv6NetToMediaType OBJECT-TYPE
        SYNTAX     INTEGER {
                    other(1),    -- none of the following
                    dynamic(2),  -- dynamically resolved
                    static(3),   -- statically configured
                    local(4)     -- local interface
                   }
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
                "The type of the mapping. The 'dynamic(2)' type
                indicates that the IPv6 address to physical
                addresses mapping has been dynamically
                resolved using the IPv6 Neighbor Discovery
                protocol. The static(3)' types indicates that
                the mapping has been statically configured.
                The local(4) indicates that the mapping is
                provided for an entity's own interface address."
        ::= { ipv6NetToMediaEntry 3 }
```

```
        ipv6IfNetToMediaState OBJECT-TYPE
            SYNTAX      INTEGER {
                        reachable(1), -- confirmed reachability

                        stale(2),     -- unconfirmed reachability

                        delay(3),     -- waiting for reachability
                                      -- confirmation before entering
                                      -- the probe state

                        probe(4),     -- actively probing

                        invalid(5),   -- an invalidated mapping

                        unknown(6)    -- state can not be determined
                                      -- for some reason.
                       }
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
                "The Neighbor Unreachability Detection [8] state
                for the interface when the address mapping in
                this entry is used."
            ::= { ipv6NetToMediaEntry 4 }

        ipv6IfNetToMediaLastUpdated OBJECT-TYPE
            SYNTAX      TimeStamp
            MAX-ACCESS  read-only
            STATUS      current
            DESCRIPTION
                "The value of sysUpTime at the time this entry
                was last updated.  If this entry was updated prior
                to the last re-initialization of the local network
                management subsystem, then this object contains
                a zero value."
            ::= { ipv6NetToMediaEntry 5 }

         ipv6NetToMediaValid OBJECT-TYPE
             SYNTAX     TruthValue
             MAX-ACCESS read-write
             STATUS     current
             DESCRIPTION
              "Setting this object to the value 'false(2)' has
              the effect of invalidating the corresponding entry
              in the ipv6NetToMediaTable.  That is, it effectively
              disassociates the interface identified with said
              entry from the mapping identified with said entry.
              It is an implementation-specific matter as to
```

```
            whether the agent removes an invalidated entry
            from the table.  Accordingly, management stations
            must be prepared to receive tabular information
            from agents that corresponds to entries not
            currently in use.  Proper interpretation of such
            entries requires examination of the relevant
            ipv6NetToMediaValid object."
          DEFVAL  { true }
          ::= { ipv6NetToMediaEntry 6 }


    -- definition of IPv6-related notifications.
    -- Note that we need ipv6NotificationPrefix with the 0
    -- sub-identifier to make this MIB to translate to
    -- an SNMPv1 format in a reversible way. For example
    -- it is needed for proxies that convert SNMPv1 traps
    -- to SNMPv2 notifications without MIB knowledge.

    ipv6Notifications      OBJECT IDENTIFIER
         ::= { ipv6MIB 2 }
    ipv6NotificationPrefix OBJECT IDENTIFIER
         ::= { ipv6Notifications 0 }

    ipv6IfStateChange NOTIFICATION-TYPE
         OBJECTS {
                  ipv6IfDescr,
                  ipv6IfOperStatus -- the new state of the If.
                 }
         STATUS             current
         DESCRIPTION
            "An ipv6IfStateChange notification signifies
            that there has been a change in the state of
            an ipv6 interface.  This notification should
            be generated when the interface's operational
            status transitions to or from the up(1) state."

         ::= { ipv6NotificationPrefix 1 }


    -- conformance information

    ipv6Conformance OBJECT IDENTIFIER ::= { ipv6MIB 3 }

    ipv6Compliances OBJECT IDENTIFIER ::= { ipv6Conformance 1 }
    ipv6Groups      OBJECT IDENTIFIER ::= { ipv6Conformance 2 }

    -- compliance statements
```

```
        ipv6Compliance MODULE-COMPLIANCE
            STATUS  current
            DESCRIPTION
              "The compliance statement for SNMPv2 entities which
              implement ipv6 MIB."
            MODULE  -- this module
                MANDATORY-GROUPS { ipv6GeneralGroup,
                                   ipv6NotificationGroup }
                  OBJECT    ipv6Forwarding
                    MIN-ACCESS  read-only
                    DESCRIPTION
                       "An agent is not required to provide write
                        access to this object"
                  OBJECT    ipv6DefaultHopLimit
                    MIN-ACCESS  read-only
                    DESCRIPTION
                       "An agent is not required to provide write
                        access to this object"
                  OBJECT    ipv6IfDescr
                    MIN-ACCESS  read-only
                    DESCRIPTION
                       "An agent is not required to provide write
                        access to this object"
                  OBJECT    ipv6IfIdentifier
                    MIN-ACCESS  read-only
                    DESCRIPTION
                       "An agent is not required to provide write
                        access to this object"
                  OBJECT    ipv6IfIdentifierLength
                    MIN-ACCESS  read-only
                    DESCRIPTION
                       "An agent is not required to provide write
                        access to this object"

                  OBJECT    ipv6IfAdminStatus
                    MIN-ACCESS  read-only
                    DESCRIPTION
                       "An agent is not required to provide write
                        access to this object"
                  OBJECT    ipv6RouteValid
                    MIN-ACCESS  read-only
                    DESCRIPTION
                       "An agent is not required to provide write
                        access to this object"
                  OBJECT    ipv6NetToMediaValid
                    MIN-ACCESS  read-only
                    DESCRIPTION
                       "An agent is not required to provide write
```

```
                    access to this object"
        ::= { ipv6Compliances 1 }

    ipv6GeneralGroup OBJECT-GROUP
        OBJECTS { ipv6Forwarding,
                  ipv6DefaultHopLimit,
                  ipv6Interfaces,
                  ipv6IfTableLastChange,
                  ipv6IfDescr,
                  ipv6IfLowerLayer,
                  ipv6IfEffectiveMtu,
                  ipv6IfReasmMaxSize,
                  ipv6IfIdentifier,
                  ipv6IfIdentifierLength,
                  ipv6IfPhysicalAddress,
                  ipv6IfAdminStatus,
                  ipv6IfOperStatus,
                  ipv6IfLastChange,
                  ipv6IfStatsInReceives,
                  ipv6IfStatsInHdrErrors,
                  ipv6IfStatsInTooBigErrors,
                  ipv6IfStatsInNoRoutes,
                  ipv6IfStatsInAddrErrors,
                  ipv6IfStatsInUnknownProtos,
                  ipv6IfStatsInTruncatedPkts,
                  ipv6IfStatsInDiscards,
                  ipv6IfStatsInDelivers,
                  ipv6IfStatsOutForwDatagrams,
                  ipv6IfStatsOutRequests,
                  ipv6IfStatsOutDiscards,
                  ipv6IfStatsOutFragOKs,
                  ipv6IfStatsOutFragFails,
                  ipv6IfStatsOutFragCreates,
                  ipv6IfStatsReasmReqds,
                  ipv6IfStatsReasmOKs,
                  ipv6IfStatsReasmFails,
                  ipv6IfStatsInMcastPkts,
                  ipv6IfStatsOutMcastPkts,
                  ipv6AddrPrefixOnLinkFlag,
                  ipv6AddrPrefixAutonomousFlag,
                  ipv6AddrPrefixAdvPreferredLifetime,
                  ipv6AddrPrefixAdvValidLifetime,
                  ipv6AddrPfxLength,
                  ipv6AddrType,
                  ipv6AddrAnycastFlag,
                  ipv6AddrStatus,
                  ipv6RouteNumber,
                  ipv6DiscardedRoutes,
```

```
                    ipv6RouteIfIndex,
                    ipv6RouteNextHop,
                    ipv6RouteType,
                    ipv6RouteProtocol,
                    ipv6RoutePolicy,
                    ipv6RouteAge,
                    ipv6RouteNextHopRDI,
                    ipv6RouteMetric,
                    ipv6RouteWeight,
                    ipv6RouteInfo,
                    ipv6RouteValid,
                    ipv6NetToMediaPhysAddress,
                    ipv6NetToMediaType,
                    ipv6IfNetToMediaState,
                    ipv6IfNetToMediaLastUpdated,
                    ipv6NetToMediaValid }
        STATUS    current
        DESCRIPTION
             "The IPv6 group of objects providing for basic
              management of IPv6 entities."
        ::= { ipv6Groups 1 }

    ipv6NotificationGroup NOTIFICATION-GROUP
        NOTIFICATIONS { ipv6IfStateChange }
        STATUS    current
        DESCRIPTION
             "The notification that an IPv6 entity is required
              to implement."


        ::= { ipv6Groups 2 }

     END
```

6. Acknowledgments

This document borrows from MIB works produced by IETF for IPv4-based internets.

We would like to thanks the following individuals for constructive and valuable comments:

Mike Daniele,
Margaret Forsythe,
Tim Hartrick,
Jean-Pierre Roch,
Juergen Schoenwaelder,
Frank Solensky,
Vivek Venkatraman.

7. References

[1] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Structure of Management Information for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1902, January 1996.

[2] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M., and S. Waldbusser, "Textual Conventions for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1903, January 1996.

[3] McCloghrie, K., and M. Rose, Editors, "Management Information Base for Network Management of TCP/IP-based internets: MIB-II", STD 17, RFC 1213, Hughes LAN Systems, Performance Systems International, March 1991.

[4] Case, J., Fedor, M., Schoffstall, M., and J. Davin, "A Simple Network Management Protocol (SNMP)", STD 15, RFC 1157, SNMP Research, Performance Systems International, MIT Lab for Computer Science, May 1990.

[5] SNMPv2 Working Group, Case, J., McCloghrie, K., Rose, M. and S. Waldbusser, "Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)", RFC 1905, January 1996.

[6] McCloghrie, K. and F. Kastenholz, "Evolution of the Interfaces Group of MIB-II", RFC 1573, January 1994.

[7] Deering, S., and R. Hinden, Editors, "Internet Protocol, Version 6 (IPv6) Specification", RFC 2460, December 1998.

[8] Narten, T., Nordmark E., and W. Simpson, "Neighbor Discovery for IP Version 6 (IPv6)", RFC 2461, December 1998.

[9] Haskin, D., and S. Onishi, "Management Information Base for IP Version 6: ICMPv6 Group", RFC 2466, December 1998.

8. Security Considerations

Certain management information defined in this MIB may be considered sensitive in some network environments.

Therefore, authentication of received SNMP requests and controlled access to management information should be employed in such environments.

9. Authors' Addresses

Dimitry Haskin
Bay Networks, Inc.
600 Technology Park Drive
Billerica, MA 01821

EMail: dhaskin@baynetworks.com

Steve Onishi
Bay Networks, Inc.
3 Federal Street
Billerica, MA 01821

EMail: sonishi@baynetworks.com

10. Full Copyright Statement