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Management Information Base for IP Version 6: ICMPv6 Group

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 document is one in the series of documents that define various MIB object groups for IPv6. Specifically, the ICMPv6 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

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 one 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 [9] as well as the ICMPv6 group defined in this document.

This document defines the ICMPv6 group of the IPv6 MIB.

3. The ICMPv6 Group

```
    IPV6-ICMP-MIB DEFINITIONS ::= BEGIN

    IMPORTS
        MODULE-IDENTITY, OBJECT-TYPE,
        Counter32, mib-2                    FROM SNMPv2-SMI
        MODULE-COMPLIANCE, OBJECT-GROUP     FROM SNMPv2-CONF
        ipv6IfEntry                         FROM IPV6-MIB;

    ipv6IcmpMIB MODULE-IDENTITY
        LAST-UPDATED "9801082155Z"
        ORGANIZATION "IETF IPv6 Working Group"
        CONTACT-INFO
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               E-mail: sonishi@baynetworks.com"
        DESCRIPTION
          "The MIB module for entities implementing
           the ICMPv6."
        ::= { mib-2 56 }

    -- the ICMPv6 group

    ipv6IcmpMIBObjects OBJECT IDENTIFIER ::= { ipv6IcmpMIB  1 }


    -- Per-interface ICMPv6 statistics table

    ipv6IfIcmpTable OBJECT-TYPE
        SYNTAX     SEQUENCE OF Ipv6IfIcmpEntry
        MAX-ACCESS not-accessible
```

```
        STATUS     current
        DESCRIPTION
         "IPv6 ICMP statistics. This table contains statistics
         of ICMPv6 messages that are received and sourced by
         the entity."
        ::= { ipv6IcmpMIBObjects 1 }

    ipv6IfIcmpEntry OBJECT-TYPE
        SYNTAX     Ipv6IfIcmpEntry
        MAX-ACCESS not-accessible
        STATUS     current
        DESCRIPTION
         "An ICMPv6 statistics entry containing
         objects at a particular IPv6 interface.

         Note that a receiving interface is
         the interface to which a given ICMPv6 message
         is addressed which may not be necessarily
         the input interface for the message.

         Similarly,  the sending interface is
         the interface that sources a given
         ICMP message which is usually but not
         necessarily the output interface for the message."
        AUGMENTS { ipv6IfEntry }
        ::= { ipv6IfIcmpTable 1 }

    Ipv6IfIcmpEntry ::= SEQUENCE {
            ipv6IfIcmpInMsgs
                  Counter32      ,
            ipv6IfIcmpInErrors
                  Counter32      ,
            ipv6IfIcmpInDestUnreachs
                  Counter32      ,
            ipv6IfIcmpInAdminProhibs
                  Counter32      ,
            ipv6IfIcmpInTimeExcds
                  Counter32      ,
            ipv6IfIcmpInParmProblems
                  Counter32      ,
            ipv6IfIcmpInPktTooBigs
                  Counter32      ,
            ipv6IfIcmpInEchos
                  Counter32      ,
            ipv6IfIcmpInEchoReplies
                  Counter32      ,
            ipv6IfIcmpInRouterSolicits
                  Counter32      ,
```

```
            ipv6IfIcmpInRouterAdvertisements
                  Counter32       ,
            ipv6IfIcmpInNeighborSolicits
                  Counter32       ,
            ipv6IfIcmpInNeighborAdvertisements
                  Counter32       ,
            ipv6IfIcmpInRedirects
                  Counter32       ,
            ipv6IfIcmpInGroupMembQueries
                  Counter32       ,
            ipv6IfIcmpInGroupMembResponses
                  Counter32       ,
            ipv6IfIcmpInGroupMembReductions
                  Counter32       ,
            ipv6IfIcmpOutMsgs
                  Counter32       ,
            ipv6IfIcmpOutErrors
                  Counter32       ,
            ipv6IfIcmpOutDestUnreachs
                  Counter32       ,
            ipv6IfIcmpOutAdminProhibs
                  Counter32       ,
            ipv6IfIcmpOutTimeExcds
                  Counter32       ,
            ipv6IfIcmpOutParmProblems
                  Counter32       ,
            ipv6IfIcmpOutPktTooBigs
                  Counter32       ,
            ipv6IfIcmpOutEchos
                  Counter32       ,
            ipv6IfIcmpOutEchoReplies
                  Counter32       ,
            ipv6IfIcmpOutRouterSolicits
                  Counter32       ,
            ipv6IfIcmpOutRouterAdvertisements
                  Counter32       ,
            ipv6IfIcmpOutNeighborSolicits
                  Counter32       ,
            ipv6IfIcmpOutNeighborAdvertisements
                  Counter32       ,
            ipv6IfIcmpOutRedirects
                  Counter32       ,
            ipv6IfIcmpOutGroupMembQueries
                  Counter32       ,
            ipv6IfIcmpOutGroupMembResponses
                  Counter32       ,
            ipv6IfIcmpOutGroupMembReductions
                  Counter32
```

```
        }

    ipv6IfIcmpInMsgs OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The total number of ICMP messages received
         by the interface which includes all those
         counted by ipv6IfIcmpInErrors. Note that this
         interface is the interface to which the
         ICMP messages were addressed which may not be
         necessarily the input interface for the messages."
        ::= { ipv6IfIcmpEntry 1 }

    ipv6IfIcmpInErrors OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP messages which the interface
         received but determined as having ICMP-specific
         errors (bad ICMP checksums, bad length, etc.)."
        ::= { ipv6IfIcmpEntry 2 }

    ipv6IfIcmpInDestUnreachs OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Destination Unreachable
         messages received by the interface."
        ::= { ipv6IfIcmpEntry 3 }

    ipv6IfIcmpInAdminProhibs OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP destination
         unreachable/communication administratively
         prohibited messages received by the interface."
        ::= { ipv6IfIcmpEntry 4 }

    ipv6IfIcmpInTimeExcds OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
```

```
        DESCRIPTION
         "The number of ICMP Time Exceeded messages
          received by the interface."
        ::= { ipv6IfIcmpEntry 5 }

    ipv6IfIcmpInParmProblems OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Parameter Problem messages
          received by the interface."
        ::= { ipv6IfIcmpEntry 6 }

    ipv6IfIcmpInPktTooBigs OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Packet Too Big messages
         received by the interface."
        ::= { ipv6IfIcmpEntry 7 }

    ipv6IfIcmpInEchos OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Echo (request) messages
          received by the interface."
        ::= { ipv6IfIcmpEntry 8 }

    ipv6IfIcmpInEchoReplies OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Echo Reply messages received
         by the interface."
        ::= { ipv6IfIcmpEntry 9 }

    ipv6IfIcmpInRouterSolicits OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Router Solicit messages
          received by the interface."
```

```
        ::= { ipv6IfIcmpEntry 10 }

    ipv6IfIcmpInRouterAdvertisements OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Router Advertisement messages
         received by the interface."
        ::= { ipv6IfIcmpEntry 11 }

    ipv6IfIcmpInNeighborSolicits OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Neighbor Solicit messages
          received by the interface."
        ::= { ipv6IfIcmpEntry 12 }

    ipv6IfIcmpInNeighborAdvertisements OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Neighbor Advertisement
         messages received by the interface."
        ::= { ipv6IfIcmpEntry 13 }

    ipv6IfIcmpInRedirects OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of Redirect messages received
         by the interface."
        ::= { ipv6IfIcmpEntry 14 }

    ipv6IfIcmpInGroupMembQueries OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMPv6 Group Membership Query
         messages received by the interface."
        ::= { ipv6IfIcmpEntry 15}

    ipv6IfIcmpInGroupMembResponses OBJECT-TYPE
```

```
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMPv6 Group Membership Response messages
         received by the interface."
        ::= { ipv6IfIcmpEntry 16}

     ipv6IfIcmpInGroupMembReductions OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMPv6 Group Membership Reduction messages
         received by the interface."
        ::= { ipv6IfIcmpEntry 17}

    ipv6IfIcmpOutMsgs OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The total number of ICMP messages which this
         interface attempted to send.  Note that this counter
         includes all those counted by icmpOutErrors."
        ::= { ipv6IfIcmpEntry 18 }

    ipv6IfIcmpOutErrors OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP messages which this interface did
         not send due to problems discovered within ICMP
         such as a lack of buffers.  This value should not
         include errors discovered outside the ICMP layer
         such as the inability of IPv6 to route the resultant
         datagram.  In some implementations there may be no
         types of error which contribute to this counter's
         value."
        ::= { ipv6IfIcmpEntry 19 }

    ipv6IfIcmpOutDestUnreachs OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Destination Unreachable
```

```
         messages sent by the interface."
        ::= { ipv6IfIcmpEntry 20 }

    ipv6IfIcmpOutAdminProhibs OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
          "Number of ICMP dest unreachable/communication
          administratively prohibited messages sent."
        ::= { ipv6IfIcmpEntry 21 }

    ipv6IfIcmpOutTimeExcds OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Time Exceeded messages sent
         by the interface."
        ::= { ipv6IfIcmpEntry 22 }

    ipv6IfIcmpOutParmProblems OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Parameter Problem messages
         sent by the interface."
        ::= { ipv6IfIcmpEntry 23 }

    ipv6IfIcmpOutPktTooBigs OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Packet Too Big messages sent
         by the interface."
        ::= { ipv6IfIcmpEntry 24 }

    ipv6IfIcmpOutEchos OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Echo (request) messages sent
         by the interface."
        ::= { ipv6IfIcmpEntry 25 }
```

```
    ipv6IfIcmpOutEchoReplies OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Echo Reply messages sent
         by the interface."
        ::= { ipv6IfIcmpEntry 26 }

    ipv6IfIcmpOutRouterSolicits OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Router Solicitation messages
          sent by the interface."
        ::= { ipv6IfIcmpEntry 27 }

    ipv6IfIcmpOutRouterAdvertisements OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Router Advertisement messages
         sent by the interface."
        ::= { ipv6IfIcmpEntry 28 }

    ipv6IfIcmpOutNeighborSolicits OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Neighbor Solicitation
          messages sent by the interface."
        ::= { ipv6IfIcmpEntry 29 }

    ipv6IfIcmpOutNeighborAdvertisements OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMP Neighbor Advertisement
         messages sent by the interface."
        ::= { ipv6IfIcmpEntry 30 }

    ipv6IfIcmpOutRedirects OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
```

```
        STATUS     current
        DESCRIPTION
         "The number of Redirect messages sent. For
         a host, this object will always be zero,
         since hosts do not send redirects."
        ::= { ipv6IfIcmpEntry 31 }

    ipv6IfIcmpOutGroupMembQueries OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMPv6 Group Membership Query
         messages sent."
        ::= { ipv6IfIcmpEntry 32}

    ipv6IfIcmpOutGroupMembResponses OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMPv6 Group Membership Response
         messages sent."
        ::= { ipv6IfIcmpEntry 33}

    ipv6IfIcmpOutGroupMembReductions OBJECT-TYPE
        SYNTAX     Counter32
        MAX-ACCESS read-only
        STATUS     current
        DESCRIPTION
         "The number of ICMPv6 Group Membership Reduction
         messages sent."
        ::= { ipv6IfIcmpEntry 34}


   -- conformance information

   ipv6IcmpConformance OBJECT IDENTIFIER ::= { ipv6IcmpMIB 2 }

   ipv6IcmpCompliances
           OBJECT IDENTIFIER ::= { ipv6IcmpConformance 1 }
   ipv6IcmpGroups
           OBJECT IDENTIFIER ::= { ipv6IcmpConformance 2 }

   -- compliance statements

   ipv6IcmpCompliance MODULE-COMPLIANCE
       STATUS  current
```

```
        DESCRIPTION
          "The compliance statement for SNMPv2 entities which
          implement ICMPv6."
        MODULE  -- this module
            MANDATORY-GROUPS { ipv6IcmpGroup }
        ::= { ipv6IcmpCompliances 1 }

    ipv6IcmpGroup OBJECT-GROUP
        OBJECTS   {
                    ipv6IfIcmpInMsgs,
                    ipv6IfIcmpInErrors,
                    ipv6IfIcmpInDestUnreachs,
                    ipv6IfIcmpInAdminProhibs,
                    ipv6IfIcmpInTimeExcds,
                    ipv6IfIcmpInParmProblems,
                    ipv6IfIcmpInPktTooBigs,
                    ipv6IfIcmpInEchos,
                    ipv6IfIcmpInEchoReplies,
                    ipv6IfIcmpInRouterSolicits,
                    ipv6IfIcmpInRouterAdvertisements,
                    ipv6IfIcmpInNeighborSolicits,
                    ipv6IfIcmpInNeighborAdvertisements,
                    ipv6IfIcmpInRedirects,
                    ipv6IfIcmpInGroupMembQueries,
                    ipv6IfIcmpInGroupMembResponses,
                    ipv6IfIcmpInGroupMembReductions,
                    ipv6IfIcmpOutMsgs,
                    ipv6IfIcmpOutErrors,
                    ipv6IfIcmpOutDestUnreachs,
                    ipv6IfIcmpOutAdminProhibs,
                    ipv6IfIcmpOutTimeExcds,
                    ipv6IfIcmpOutParmProblems,
                    ipv6IfIcmpOutPktTooBigs,
                    ipv6IfIcmpOutEchos,
                    ipv6IfIcmpOutEchoReplies,
                    ipv6IfIcmpOutRouterSolicits,
                    ipv6IfIcmpOutRouterAdvertisements,
                    ipv6IfIcmpOutNeighborSolicits,
                    ipv6IfIcmpOutNeighborAdvertisements,
                    ipv6IfIcmpOutRedirects,
                    ipv6IfIcmpOutGroupMembQueries,
                    ipv6IfIcmpOutGroupMembResponses,
                    ipv6IfIcmpOutGroupMembReductions
                  }
        STATUS    current
        DESCRIPTION
             "The ICMPv6 group of objects providing information
              specific to ICMPv6."
```

```
    ::= { ipv6IcmpGroups 1 }

END
```

4. Acknowledgments

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

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

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5. 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, March 1991.

[4] Case, J., Fedor, M., Schoffstall, M. and J. Davin, "A Simple Network Management Protocol (SNMP)", STD 15, RFC 1157, 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] Conta, A. and S. Deering, "Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification", RFC 2463, December 1998.

[9] Haskin, D., and S. Onishi, "Management Information Base for IP Version 6: Textual Conventions and General Group", RFC 2465, December 1998.

6. 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.

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