

Network Working Group
Request for Comments: 2466
Category: Standards Track

D. Haskin
S. Onishi
Bay Networks, Inc.
December 1998

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.

Copyright Notice

Copyright (C) The Internet Society (1998). All Rights Reserved.

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	2
1.1 Object Definitions	2
2. Overview	2
3. The ICMPv6 Group	3
4. Acknowledgments	14
5. References	14
6. Security Considerations	15
7. Authors' Addresses.....	15
8. Full Copyright Statement.....	16

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
        "          Dimitry Haskin
```

```
        Postal: Bay Networks, Inc.
                660 Technology 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 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,
 ipv6IfIcmpInDestUnreaches,
 ipv6IfIcmpInAdminProhibs,
 ipv6IfIcmpInTimeExcds,
 ipv6IfIcmpInParmProblems,
 ipv6IfIcmpInPktTooBigs,
 ipv6IfIcmpInEchos,
 ipv6IfIcmpInEchoReplies,
 ipv6IfIcmpInRouterSolicits,
 ipv6IfIcmpInRouterAdvertisements,
 ipv6IfIcmpInNeighborSolicits,
 ipv6IfIcmpInNeighborAdvertisements,
 ipv6IfIcmpInRedirects,
 ipv6IfIcmpInGroupMembQueries,
 ipv6IfIcmpInGroupMembResponses,
 ipv6IfIcmpInGroupMembReductions,
 ipv6IfIcmpOutMsgs,
 ipv6IfIcmpOutErrors,
 ipv6IfIcmpOutDestUnreaches,
 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:

Mike Daniele,
Margaret Forsythe,
Jean-Pierre Roch,
Juergen Schoenwaelder,
Vivek Venkatraman.

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.

7. 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

8. Full Copyright Statement

Copyright (C) The Internet Society (1998). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

