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Internet Group Management Protocol MIB

Status of this Memo

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

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Abstract

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes objects used for managing the Internet Group Management Protocol (IGMP).

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1. Introduction

This memo defines a portion of the Management Information Base (MIB) for use with network management protocols in the Internet community. In particular, it describes objects used for managing the Internet

Group Management Protocol (IGMP), version 1 [16] or version 2 [17]. A future version of this MIB will support IGMP version 3 (currently a work in progress). All of this MIB module is applicable to IPv4 multicast routers; a subset is applicable to hosts implementing IGMP. Since IGMP is specific to IPv4, this MIB does not support management of equivalent functionality for other address families, such as IPv6. Such management may be supported by other MIBs.

2. The SNMP Network Management Framework

The SNMP Management Framework presently consists of five major components:

- o An overall architecture, described in RFC 2571 [1].
- o Mechanisms for describing and naming objects and events for the purpose of management. The first version of this Structure of Management Information (SMI) is called SMIV1 and described in STD 16, RFC 1155 [2], STD 16, RFC 1212 [3] and RFC 1215 [4]. The second version, called SMIV2, is described in STD 58, RFC 2578 [5], STD 58, RFC 2579 [6] and STD 58, RFC 2580 [7].
- o Message protocols for transferring management information. The first version of the SNMP message protocol is called SNMPv1 and described in STD 15, RFC 1157 [8]. A second version of the SNMP message protocol, which is not an Internet standards track protocol, is called SNMPv2c and described in RFC 1901 [9] and RFC 1906 [10]. The third version of the message protocol is called SNMPv3 and described in RFC 1906 [10], RFC 2572 [11] and RFC 2574 [12].
- o Protocol operations for accessing management information. The first set of protocol operations and associated PDU formats is described in STD 15, RFC 1157 [8]. A second set of protocol operations and associated PDU formats is described in RFC 1905 [13].
- o A set of fundamental applications described in RFC 2573 [14] and the view-based access control mechanism described in RFC 2575 [15].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. Objects in the MIB are defined using the mechanisms defined in the SMI.

This memo specifies a MIB module that is compliant to the SMIV2. A MIB conforming to the SMIV1 can be produced through the appropriate translations. The resulting translated MIB must be semantically

equivalent, except where objects or events are omitted because no translation is possible (use of Counter64). Some machine readable information in SMIV2 will be converted into textual descriptions in SMIV1 during the translation process. However, this loss of machine readable information is not considered to change the semantics of the MIB.

3. Overview

This MIB module contains two tables:

- (1) the IGMP Interface Table which contains one row for each interface on which IGMP is enabled, and
- (2) the IGMP Cache Table which contains one row for each IP multicast group for which there are members on a particular interface.

Both tables are intended to be implemented by hosts and routers, but some columnar objects in each table apply only to routers.

4. Definitions

```
IGMP-STD-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY, OBJECT-TYPE, mib-2, Counter32, Gauge32,
    Unsigned32, IPAddress, TimeTicks FROM SNMPv2-SMI
    RowStatus, TruthValue                FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP FROM SNMPv2-CONF
    InterfaceIndexOrZero,
    InterfaceIndex                        FROM IF-MIB;
```

```
igmpStdMIB MODULE-IDENTITY
```

```
    LAST-UPDATED "200009280000Z" -- September 28, 2000
```

```
    ORGANIZATION "IETF IDMR Working Group."
```

```
    CONTACT-INFO
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```

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```

```
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```

```
    DESCRIPTION
```

```
        "The MIB module for IGMP Management."
```

```
    REVISION      "200009280000Z" -- September 28, 2000
```

DESCRIPTION

"Initial version, published as RFC 2933."
 ::= { mib-2 85 }

igmpMIBObjects OBJECT IDENTIFIER ::= { igmpStdMIB 1 }

--
 -- The IGMP Interface Table
 --

igmpInterfaceTable OBJECT-TYPE

SYNTAX SEQUENCE OF IgmpInterfaceEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"The (conceptual) table listing the interfaces on which IGMP
 is enabled."

::= { igmpMIBObjects 1 }

igmpInterfaceEntry OBJECT-TYPE

SYNTAX IgmpInterfaceEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry (conceptual row) representing an interface on
 which IGMP is enabled."

INDEX { igmpInterfaceIfIndex }

::= { igmpInterfaceTable 1 }

IgmpInterfaceEntry ::= SEQUENCE {

igmpInterfaceIfIndex InterfaceIndex,

igmpInterfaceQueryInterval Unsigned32,

igmpInterfaceStatus RowStatus,

igmpInterfaceVersion Unsigned32,

igmpInterfaceQuerier IpAddress,

igmpInterfaceQueryMaxResponseTime Unsigned32,

igmpInterfaceQuerierUpTime TimeTicks,

igmpInterfaceQuerierExpiryTime TimeTicks,

igmpInterfaceVersion1QuerierTimer TimeTicks,

igmpInterfaceWrongVersionQueries Counter32,

igmpInterfaceJoins Counter32,

igmpInterfaceProxyIfIndex InterfaceIndexOrZero,

igmpInterfaceGroups Gauge32,

igmpInterfaceRobustness Unsigned32,

igmpInterfaceLastMembQueryIntvl Unsigned32

}

```
igmpInterfaceIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The ifIndex value of the interface for which IGMP is
        enabled."
    ::= { igmpInterfaceEntry 1 }

igmpInterfaceQueryInterval OBJECT-TYPE
    SYNTAX      Unsigned32
    UNITS       "seconds"
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The frequency at which IGMP Host-Query packets are
        transmitted on this interface."
    DEFVAL     { 125 }
    ::= { igmpInterfaceEntry 2 }

igmpInterfaceStatus OBJECT-TYPE
    SYNTAX      RowStatus
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The activation of a row enables IGMP on the interface.  The
        destruction of a row disables IGMP on the interface."
    ::= { igmpInterfaceEntry 3 }

igmpInterfaceVersion OBJECT-TYPE
    SYNTAX      Unsigned32
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "The version of IGMP which is running on this interface.
        This object can be used to configure a router capable of
        running either value.  For IGMP to function correctly, all
        routers on a LAN must be configured to run the same version
        of IGMP on that LAN."
    DEFVAL     { 2 }
    ::= { igmpInterfaceEntry 4 }

igmpInterfaceQuerier OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The address of the IGMP Querier on the IP subnet to which
```

```
        this interface is attached."  
 ::= { igmpInterfaceEntry 5 }
```

```
igmpInterfaceQueryMaxResponseTime OBJECT-TYPE  
SYNTAX      Unsigned32 (0..255)  
UNITS       "tenths of seconds"  
MAX-ACCESS  read-create  
STATUS      current  
DESCRIPTION  
    "The maximum query response time advertised in IGMPv2  
    queries on this interface."  
DEFVAL      { 100 }  
 ::= { igmpInterfaceEntry 6 }
```

```
igmpInterfaceQuerierUpTime OBJECT-TYPE  
SYNTAX      TimeTicks  
MAX-ACCESS  read-only  
STATUS      current  
DESCRIPTION  
    "The time since igmpInterfaceQuerier was last changed."  
 ::= { igmpInterfaceEntry 7 }
```

```
igmpInterfaceQuerierExpiryTime OBJECT-TYPE  
SYNTAX      TimeTicks  
MAX-ACCESS  read-only  
STATUS      current  
DESCRIPTION  
    "The amount of time remaining before the Other Querier  
    Present Timer expires.  If the local system is the querier,  
    the value of this object is zero."  
 ::= { igmpInterfaceEntry 8 }
```

```
igmpInterfaceVersion1QuerierTimer OBJECT-TYPE  
SYNTAX      TimeTicks  
MAX-ACCESS  read-only  
STATUS      current  
DESCRIPTION  
    "The time remaining until the host assumes that there are no  
    IGMPv1 routers present on the interface.  While this is non-  
    zero, the host will reply to all queries with version 1  
    membership reports."  
 ::= { igmpInterfaceEntry 9 }
```

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

"The number of queries received whose IGMP version does not match igmpInterfaceVersion, over the lifetime of the row entry. IGMP requires that all routers on a LAN be configured to run the same version of IGMP. Thus, if any queries are received with the wrong version, this indicates a configuration error."

::= { igmpInterfaceEntry 10 }

igmpInterfaceJoins OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The number of times a group membership has been added on this interface; that is, the number of times an entry for this interface has been added to the Cache Table. This object gives an indication of the amount of IGMP activity over the lifetime of the row entry."

::= { igmpInterfaceEntry 11 }

igmpInterfaceProxyIfIndex OBJECT-TYPE

SYNTAX InterfaceIndexOrZero

MAX-ACCESS read-create

STATUS current

DESCRIPTION

"Some devices implement a form of IGMP proxying whereby memberships learned on the interface represented by this row, cause IGMP Host Membership Reports to be sent on the interface whose ifIndex value is given by this object. Such a device would implement the igmpV2RouterMIBGroup only on its router interfaces (those interfaces with non-zero igmpInterfaceProxyIfIndex). Typically, the value of this object is 0, indicating that no proxying is being done."

DEFVAL { 0 }

::= { igmpInterfaceEntry 12 }

igmpInterfaceGroups OBJECT-TYPE

SYNTAX Gauge32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The current number of entries for this interface in the Cache Table."

::= { igmpInterfaceEntry 13 }

igmpInterfaceRobustness OBJECT-TYPE

SYNTAX Unsigned32 (1..255)

MAX-ACCESS read-create

```

STATUS      current
DESCRIPTION
    "The Robustness Variable allows tuning for the expected
    packet loss on a subnet.  If a subnet is expected to be
    lossy, the Robustness Variable may be increased.  IGMP is
    robust to (Robustness Variable-1) packet losses."
DEFVAL      { 2 }
 ::= { igmpInterfaceEntry 14 }

```

```
igmpInterfaceLastMembQueryIntvl OBJECT-TYPE
```

```
SYNTAX      Unsigned32 (0..255)
```

```
UNITS       "tenths of seconds"
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```

    "The Last Member Query Interval is the Max Response Time
    inserted into Group-Specific Queries sent in response to
    Leave Group messages, and is also the amount of time between
    Group-Specific Query messages.  This value may be tuned to
    modify the leave latency of the network.  A reduced value
    results in reduced time to detect the loss of the last
    member of a group.  The value of this object is irrelevant
    if igmpInterfaceVersion is 1."

```

```
DEFVAL      { 10 }
```

```
 ::= { igmpInterfaceEntry 15 }
```

```
--
```

```
-- The IGMP Cache Table
```

```
--
```

```
igmpCacheTable OBJECT-TYPE
```

```
SYNTAX      SEQUENCE OF IgmpCacheEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```

    "The (conceptual) table listing the IP multicast groups for
    which there are members on a particular interface."

```

```
 ::= { igmpMIBObjects 2 }
```

```
igmpCacheEntry OBJECT-TYPE
```

```
SYNTAX      IgmpCacheEntry
```

```
MAX-ACCESS  not-accessible
```

```
STATUS      current
```

```
DESCRIPTION
```

```

    "An entry (conceptual row) in the igmpCacheTable."

```

```
INDEX       { igmpCacheAddress, igmpCacheIfIndex }
```

```
 ::= { igmpCacheTable 1 }
```

```

IcmpCacheEntry ::= SEQUENCE {
    igmpCacheAddress      IpAddress,
    igmpCacheIfIndex     InterfaceIndex,
    igmpCacheSelf        TruthValue,
    igmpCacheLastReporter IpAddress,
    igmpCacheUpTime      TimeTicks,
    igmpCacheExpiryTime  TimeTicks,
    igmpCacheStatus      RowStatus,
    igmpCacheVersion1HostTimer TimeTicks
}

igmpCacheAddress OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The IP multicast group address for which this entry
        contains information."
    ::= { igmpCacheEntry 1 }

igmpCacheIfIndex OBJECT-TYPE
    SYNTAX      InterfaceIndex
    MAX-ACCESS  not-accessible
    STATUS      current
    DESCRIPTION
        "The interface for which this entry contains information for
        an IP multicast group address."
    ::= { igmpCacheEntry 2 }

igmpCacheSelf OBJECT-TYPE
    SYNTAX      TruthValue
    MAX-ACCESS  read-create
    STATUS      current
    DESCRIPTION
        "An indication of whether the local system is a member of
        this group address on this interface."
    DEFVAL     { true }
    ::= { igmpCacheEntry 3 }

igmpCacheLastReporter OBJECT-TYPE
    SYNTAX      IpAddress
    MAX-ACCESS  read-only
    STATUS      current
    DESCRIPTION
        "The IP address of the source of the last membership report
        received for this IP Multicast group address on this
        interface.  If no membership report has been received, this
        object has the value 0.0.0.0."

```

```
::= { igmpCacheEntry 4 }
```

```
igmpCacheUpTime OBJECT-TYPE
```

```
SYNTAX      TimeTicks
```

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

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The time elapsed since this entry was created."
```

```
::= { igmpCacheEntry 5 }
```

```
igmpCacheExpiryTime OBJECT-TYPE
```

```
SYNTAX      TimeTicks
```

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

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The minimum amount of time remaining before this entry will be aged out. A value of 0 indicates that the entry is only present because igmpCacheSelf is true and that if the router left the group, this entry would be aged out immediately.
```

```
    Note that some implementations may process membership reports from the local system in the same way as reports from other hosts, so a value of 0 is not required."
```

```
::= { igmpCacheEntry 6 }
```

```
igmpCacheStatus OBJECT-TYPE
```

```
SYNTAX      RowStatus
```

```
MAX-ACCESS  read-create
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The status of this entry."
```

```
::= { igmpCacheEntry 7 }
```

```
igmpCacheVersion1HostTimer OBJECT-TYPE
```

```
SYNTAX      TimeTicks
```

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

```
STATUS      current
```

```
DESCRIPTION
```

```
    "The time remaining until the local router will assume that there are no longer any IGMP version 1 members on the IP subnet attached to this interface. Upon hearing any IGMPv1 Membership Report, this value is reset to the group membership timer. While this time remaining is non-zero, the local router ignores any IGMPv2 Leave messages for this group that it receives on this interface."
```

```
::= { igmpCacheEntry 8 }
```

```
-- conformance information
```

```
igmpMIBConformance
    OBJECT IDENTIFIER ::= { igmpStdMIB 2 }
igmpMIBCompliances
    OBJECT IDENTIFIER ::= { igmpMIBConformance 1 }
igmpMIBGroups    OBJECT IDENTIFIER ::= { igmpMIBConformance 2 }

-- compliance statements

igmpV1HostMIBCompliance MODULE-COMPLIANCE
    STATUS    current
    DESCRIPTION
        "The compliance statement for hosts running IGMPv1 and
        implementing the IGMP MIB."
    MODULE -- this module
    MANDATORY-GROUPS { igmpBaseMIBGroup }

    OBJECT      igmpInterfaceStatus
    MIN-ACCESS  read-only
    DESCRIPTION
        "Write access is not required."

    OBJECT      igmpCacheStatus
    MIN-ACCESS  read-only
    DESCRIPTION
        "Write access is not required."

    ::= { igmpMIBCompliances 1 }

igmpV1RouterMIBCompliance MODULE-COMPLIANCE
    STATUS    current
    DESCRIPTION
        "The compliance statement for routers running IGMPv1 and
        implementing the IGMP MIB."
    MODULE -- this module
    MANDATORY-GROUPS { igmpBaseMIBGroup,
                        igmpRouterMIBGroup
                      }

    OBJECT      igmpInterfaceStatus
    MIN-ACCESS  read-only
    DESCRIPTION
        "Write access is not required."
    OBJECT      igmpCacheStatus
    MIN-ACCESS  read-only
    DESCRIPTION
        "Write access is not required."
```

```
::= { igmpMIBCompliances 2 }
```

```
igmpV2HostMIBCompliance MODULE-COMPLIANCE
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The compliance statement for hosts running IGMPv2 and  
implementing the IGMP MIB."
```

```
MODULE -- this module
```

```
MANDATORY-GROUPS { igmpBaseMIBGroup,  
                    igmpV2HostMIBGroup  
                  }
```

```
OBJECT igmpInterfaceStatus
```

```
MIN-ACCESS read-only
```

```
DESCRIPTION
```

```
"Write access is not required."
```

```
OBJECT igmpCacheStatus
```

```
MIN-ACCESS read-only
```

```
DESCRIPTION
```

```
"Write access is not required."
```

```
::= { igmpMIBCompliances 3 }
```

```
igmpV2RouterMIBCompliance MODULE-COMPLIANCE
```

```
STATUS current
```

```
DESCRIPTION
```

```
"The compliance statement for routers running IGMPv2 and  
implementing the IGMP MIB."
```

```
MODULE -- this module
```

```
MANDATORY-GROUPS { igmpBaseMIBGroup,  
                    igmpRouterMIBGroup,  
                    igmpV2RouterMIBGroup  
                  }
```

```
OBJECT igmpInterfaceStatus
```

```
MIN-ACCESS read-only
```

```
DESCRIPTION
```

```
"Write access is not required."
```

```
OBJECT igmpCacheStatus
```

```
MIN-ACCESS read-only
```

```
DESCRIPTION
```

```
"Write access is not required."
```

```
::= { igmpMIBCompliances 4 }
```

```
-- units of conformance
```

```
igmpBaseMIBGroup OBJECT-GROUP
  OBJECTS { igmpCacheSelf,
            igmpCacheStatus, igmpInterfaceStatus
          }
  STATUS current
  DESCRIPTION
    "The basic collection of objects providing management of
    IGMP version 1 or 2."
  ::= { igmpMIBGroups 1 }

igmpRouterMIBGroup OBJECT-GROUP
  OBJECTS { igmpCacheUpTime, igmpCacheExpiryTime,
            igmpInterfaceJoins, igmpInterfaceGroups,
            igmpCacheLastReporter, igmpInterfaceQuerierUpTime,
            igmpInterfaceQuerierExpiryTime,
            igmpInterfaceQueryInterval
          }
  STATUS current
  DESCRIPTION
    "A collection of additional objects for management of IGMP
    version 1 or 2 in routers."
  ::= { igmpMIBGroups 2 }

igmpV2HostMIBGroup OBJECT-GROUP
  OBJECTS { igmpInterfaceVersion1QuerierTimer }
  STATUS current
  DESCRIPTION
    "A collection of additional objects for management of IGMP
    version 2 in hosts."
  ::= { igmpMIBGroups 3 }

igmpHostOptMIBGroup OBJECT-GROUP
  OBJECTS { igmpCacheLastReporter, igmpInterfaceQuerier }
  STATUS current
  DESCRIPTION
    "A collection of optional objects for IGMP hosts.
    Supporting this group can be especially useful in an
    environment with a router which does not support the IGMP
    MIB."
  ::= { igmpMIBGroups 4 }

igmpV2RouterMIBGroup OBJECT-GROUP
  OBJECTS { igmpInterfaceVersion, igmpInterfaceQuerier,
            igmpInterfaceQueryMaxResponseTime,
            igmpInterfaceRobustness,
            igmpInterfaceWrongVersionQueries,
```

```
        igmpInterfaceLastMembQueryIntvl,
        igmpCacheVersion1HostTimer
    }
STATUS    current
DESCRIPTION
    "A collection of additional objects for management of IGMP
    version 2 in routers."
 ::= { igmpMIBGroups 5 }

igmpV2ProxyMIBGroup OBJECT-GROUP
OBJECTS { igmpInterfaceProxyIfIndex }
STATUS    current
DESCRIPTION
    "A collection of additional objects for management of IGMP
    proxy devices."
 ::= { igmpMIBGroups 6 }

END
```

5. Security Considerations

This MIB contains readable objects whose values provide information related to multicast sessions. Some of these objects could contain sensitive information. In particular, the `igmpCacheSelf` and `igmpCacheLastReporter` can be used to identify machines which are listening to a given group address. There are also a number of objects that have a MAX-ACCESS clause of read-write and/or read-create, which allow an administrator to configure IGMP in the router.

While unauthorized access to the readable objects is relatively innocuous, unauthorized access to the write-able objects could cause a denial of service. Hence, the support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

SNMPv1 by itself is such an insecure environment. Even if the network itself is secure (for example by using IPSec), even then, there is no control as to who on the secure network is allowed to access and SET (change/create/delete) the objects in this MIB.

It is recommended that the implementers consider the security features as provided by the SNMPv3 framework. Specifically, the use of the User-based Security Model RFC 2574 [12] and the View-based Access Control Model RFC 2575 [15] is recommended.

It is then a customer/user responsibility to ensure that the SNMP entity giving access to this MIB, is properly configured to give access to those objects only to those principals (users) that have legitimate rights to access them.

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7. Acknowledgements

This MIB module was updated based on feedback from the IETF's Inter-Domain Multicast Routing (IDMR) Working Group.

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