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:

- An overall architecture, described in RFC 2571 [1].

- 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].

- 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].

- 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].

- 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
        " Dave Thaler
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    DESCRIPTION
        "The MIB module for IGMP Management."
    REVISION     "2000092800000Z" -- 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
::= { 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
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 }
IgmpCacheEntry ::= 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,
            igmpInterfaceLastReporter, 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 { igmpInterfaceLastReporter, 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,
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

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9. References


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