Multicast Address Allocation 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 managed objects used for managing multicast address allocation.

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1. Introduction

This document defines a Management Information Base (MIB) module for managing multicast address allocation in a protocol-independent manner, as well as for managing specific protocols used in allocating multicast addresses. The protocol-independent objects in this MIB apply to all multicast address allocation servers (MAASs) and clients, as described in [ARCH], including those that allocate source-specific multicast addresses for the local machine.

The protocol-specific objects in this MIB include objects related to the Multicast Address Dynamic Client Allocation Protocol (MADCAP) [MADCAP]. Interactions with the Multicast-scope Zone Announcement Protocol (MZAP) [MZAP] are also noted where appropriate.

2. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to section 7 of RFC 3410 [RFC3410].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP).

Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIv2, which is described in STD 58, RFC 2578 [RFC2578], STD 58, RFC 2579 [RFC2579] and STD 58, RFC 2580 [RFC2580].

3. Overview

The purpose of this MIB module is to provide the ability to configure and monitor the status of multicast address allocation within the local domain.

Some important monitoring questions which can be answered by this MIB module include:

- How full is scope X?
- Who’s using up the space?
- Who allocated a given address A?
- Are requests being met?
This MIB module is divided into two primary sections:

- Protocol-independent objects relevant to all multicast address allocation servers and clients.
- Protocol-specific objects related to the MADCAP client-server protocol.

### 3.1. Protocol-independent objects

The protocol-independent objects consist of one "capabilities" scalar and five tables. The tables are:

- The Scope Table contains information on the multicast scopes known to a multicast address allocation server. This table allows configuring scopes, and viewing what scopes are known to the local system after being configured elsewhere.

- The Scope Name Table contains the names of the multicast scopes. This table logically extends the Scope Table with the list of scope names in various languages for each scope.

- The Allocation Range Table contains the address ranges out of which the device may allocate addresses. It also allows answering the questions "How full is scope X?" and "Are requests being met?"

- The Request Table contains the requests for address allocations, and allows answering the question "Who’s using up the space?"

- The Address Table contains the blocks of addresses which have been allocated, and together with the Request Table, allows answering the question "Who allocated a given address A?"

### 3.2. Protocol-specific objects

The MADCAP objects consist of a group of (scalar) configuration parameters, and a group of (scalar) statistics.
4. Definitions

MALLOC-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, OBJECT-IDENTITY, mib-2,
    Unsigned32, Gauge32, Counter32 FROM SNMPv2-SMI
    RowStatus, TruthValue, StorageType FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP FROM SNMPv2-CONF
    InetAddress, InetAddressType FROM INET-ADDRESS-MIB
    LanguageTag FROM IPMROUTE-STD-MIB
    SnmpAdminString FROM SNMP-FRAMEWORK-MIB

    IANAascopeSource, IANAmallocRangeSource FROM IANA-MALLOC-MIB;

mallocMIB MODULE-IDENTITY
    LAST-UPDATED "200306090000Z" -- June 9, 2003
    ORGANIZATION "IETF MALLOC Working Group"
    CONTACT-INFO
        " WG-EMail: malloc@catarina.usc.edu
        Subscribe: malloc-request@catarina.usc.edu
        Archive: catarina.usc.edu/pub/multicast/malloc/

        Co-chair/editor:
        Dave Thaler
        Microsoft Corporation
        One Microsoft Way
        Redmond, WA 98052
        EMail: dthaler@microsoft.com

        Co-chair:
        Steve Hanna
        Sun Microsystems, Inc.
        One Network Drive
        Burlington, MA 01803
        EMail: steve.hanna@sun.com"

DESCRIPTION
    "The MIB module for management of multicast address allocation.

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    this MIB module is part of RFC 3559; see the RFC itself for
    full legal notices."
-- revision log

REVISION       "200306090000Z" -- June 9, 2003
DESCRIPTION    "Initial version, published as RFC 3559."
::= { mib-2 101 }

mallocMIBObjects OBJECT IDENTIFIER ::= { mallocMIB 1 }
malloc OBJECT IDENTIFIER ::= { mallocMIBObjects 1 }
madcap OBJECT IDENTIFIER ::= { mallocMIBObjects 2 }

--
-- scalars
--

mallocCapabilities OBJECT-TYPE
SYNTAX     BITS {
    startTime(0),
    serverMobility(1),
    retryAfter(2)
}
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
    "This object describes the capabilities which a client or server supports. The startTime bit indicates that allocations with a future start time are supported. The serverMobility bit indicates that allocations can be renewed or released from a server other than the one granting the original allocation. The retryAfter bit indicates support for a waiting state where the client may check back at a later time to get the status of its request."
::= { malloc 1 }

--
-- the Scope Table
--

mallocScopeTable OBJECT-TYPE
SYNTAX     SEQUENCE OF MallocScopeEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
    "The (conceptual) table containing information on multicast scopes from which addresses may be allocated. Entries in this table may be dynamically discovered via some other
protocol, such as MZAP, or may be statically configured, such as in an isolated network environment. Each scope is associated with a range of multicast addresses, and ranges for different rows must be disjoint.

::= { malloc 2 }

mallocScopeEntry OBJECT-TYPE
SYNTAX     MallocScopeEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"An entry (conceptual row) containing the information on a particular multicast scope."
INDEX      { mallocScopeAddressType, mallocScopeFirstAddress }
::= { mallocScopeTable 1 }

MallocScopeEntry ::= SEQUENCE {
    mallocScopeAddressType          InetAddressType,
    mallocScopeFirstAddress         InetAddress,
    mallocScopeLastAddress          InetAddress,
    mallocScopeHopLimit             Unsigned32,
    mallocScopeStatus               RowStatus,
    mallocScopeSource               IANAascopeSource,
    mallocScopeDivisible            TruthValue,
    mallocScopeServerAddressType    InetAddressType,
    mallocScopeServerAddress        InetAddress,
    mallocScopeSSM                  TruthValue,
    mallocScopeStorage              StorageType
}

mallocScopeAddressType OBJECT-TYPE
SYNTAX     InetAddressType
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"The type of the addresses in the multicast scope range. Legal values correspond to the subset of address families for which multicast address allocation is supported."
::= { mallocScopeEntry 1 }

mallocScopeFirstAddress OBJECT-TYPE
SYNTAX     InetAddress (SIZE(0..20))
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
"The first address in the multicast scope range. The type of this address is determined by the value of the mallocScopeAddressType object."
::= { mallocScopeEntry 2 }

mallocScopeLastAddress OBJECT-TYPE
SYNTAX     InetAddress (SIZE(0..20))
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"The last address in the multicast scope range. The type of
this address is determined by the value of the
mallocScopeAddressType object."
::= { mallocScopeEntry 3 }

mallocScopeHopLimit OBJECT-TYPE
SYNTAX     Unsigned32 (0..255)
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"The default IPv4 TTL or IPv6 hop limit which applications
should use for groups within the scope."
DEFVAL     { 255 }
::= { mallocScopeEntry 4 }

mallocScopeStatus OBJECT-TYPE
SYNTAX     RowStatus
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"The status of this row, by which new entries may be
created, or old entries deleted from this table. If write
access is supported, the other writable objects in this
table may be modified even while the status is ‘active’."
::= { mallocScopeEntry 5 }

mallocScopeSource OBJECT-TYPE
SYNTAX     IANAscopeSource
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
"The method by which this entry was learned."
::= { mallocScopeEntry 6 }

mallocScopeDivisible OBJECT-TYPE
SYNTAX     TruthValue
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"If false, the server may allocate addresses out of the
entire range. If true, the server must not allocate
addresses out of the entire range, but may only allocate addresses out of a subrange learned via another method. Creating or deleting a scope which is not divisible has the side effect of creating or deleting the corresponding entry in the mallocAllocRangeTable. Deleting a scope which is divisible has the side effect of deleting any corresponding entries in the mallocAllocRangeTable, and the mallocRequestTable.

DEFVAL { false }
 ::= { mallocScopeEntry 7 }

mallocScopeServerAddressType OBJECT-TYPE
 SYNTAX     InetAddressType
 MAX-ACCESS read-create
 STATUS     current
 DESCRIPTION
 "The type of the address of a multicast address allocation server to which a request may be sent."
 DEFVAL { unknown }
 ::= { mallocScopeEntry 8 }

mallocScopeServerAddress OBJECT-TYPE
 SYNTAX     InetAddress
 MAX-ACCESS read-create
 STATUS     current
 DESCRIPTION
 "The address of a multicast address allocation server to which a request may be sent. The default value is an zero-length address, indicating that no server is known. The type of this address is determined by the value of the mallocScopeServerAddressType object."
 DEFVAL { ''h } -- the empty string
 ::= { mallocScopeEntry 9 }

mallocScopeSSM OBJECT-TYPE
 SYNTAX     TruthValue
 MAX-ACCESS read-create
 STATUS     current
 DESCRIPTION
 "Indicates whether the scope is a Source-Specific Multicast (SSM) range."
 DEFVAL { false }
 ::= { mallocScopeEntry 10 }

mallocScopeStorage OBJECT-TYPE
 SYNTAX     StorageType
 MAX-ACCESS read-create
 STATUS     current
DESCRIPTION
"The storage type for this conceptual row. Conceptual rows having the value 'permanent' need not allow write-access to any columnar objects in the row."

DEFVAL { nonVolatile }
::= { mallocScopeEntry 11 }

--
-- the Scope Name Table
--

mallocScopeNameTable OBJECT-TYPE
SYNTAX      SEQUENCE OF MallocScopeNameEntry
MAX-ACCESS not-accessible
STATUS      current
DESCRIPTION
"The (conceptual) table containing information on multicast scope names. Entries in this table may be dynamically discovered via some other protocol, such as MZAP, or may be statically configured, such as in an isolated network environment."
::= { malloc 3 }

MallocScopeNameEntry OBJECT-TYPE
SYNTAX      MallocScopeNameEntry
MAX-ACCESS not-accessible
STATUS      current
DESCRIPTION
"An entry (conceptual row) containing the information on a particular multicast scope name."
INDEX      { mallocScopeAddressType, mallocScopeFirstAddress, IMPLIED mallocScopeNameLangName }
::= { mallocScopeNameTable 1 }

MallocScopeNameEntry ::= SEQUENCE {
  mallocScopeNameLangName         LanguageTag,
  mallocScopeNameScopeName        SnmpAdminString,
  mallocScopeNameDefault          TruthValue,
  mallocScopeNameStatus           RowStatus,
  mallocScopeNameStorage          StorageType
}

mallocScopeNameLangName OBJECT-TYPE
SYNTAX      LanguageTag (SIZE(1..94))
MAX-ACCESS not-accessible
STATUS      current
DESCRIPTION
"The RFC 3066 language tag for the language of the scope name."
 ::= { mallocScopeNameEntry 1 }

mallocScopeNameScopeName OBJECT-TYPE
SYNTAX     SnmpAdminString
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"The textual name associated with the multicast scope. The value of this object should be suitable for displaying to end-users, such as when allocating a multicast address in this scope. If the scope is an IPv4 scope, and no name is specified, the default value of this object should be the string 239.x.x.x/y with x and y replaced appropriately to describe the address and mask length associated with the scope. If the scope is an IPv6 scope, and no name is specified, the default value of this object should generically describe the scope level (e.g., site)."
 ::= { mallocScopeNameEntry 2 }

mallocScopeNameDefault OBJECT-TYPE
SYNTAX     TruthValue
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"If true, indicates a preference that the name in the associated language should be used by applications if no name is available in a desired language."
DEFVAL     { false }
 ::= { mallocScopeNameEntry 3 }

mallocScopeNameStatus OBJECT-TYPE
SYNTAX     RowStatus
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"The status of this row, by which new entries may be created, or old entries deleted from this table. If write access is supported, the other writable objects in this table may be modified even while the status is 'active'."
 ::= { mallocScopeNameEntry 4 }

mallocScopeNameStorage OBJECT-TYPE
SYNTAX     StorageType
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
"The storage type for this conceptual row. Conceptual rows
having the value 'permanent' need not allow write-access to
any columnar objects in the row."
DEFVAL { nonVolatile }
::= { mallocScopeNameEntry 5 }

--
-- the Allocation Range Table
--
mallocAllocRangeTable OBJECT-TYPE
SYNTAX SEQUENCE OF MallocAllocRangeEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The (conceptual) table containing information on subranges
of addresses from which the device may allocate addresses,
if it is a MAAS. If the device is a Prefix Coordinator, any
ranges which the device is advertising to MAAS’s will be in
this table. Note that the device may be both a MAAS and a
Prefix Coordinator.

Address ranges for different rows must be disjoint, and must
be contained with the address range of the corresponding row
of the mallocScopeTable.

Deleting an allocation range has the side effect of deleting
any entries within that range from the mallocAddressTable."
::= { malloc 4 }

MallocAllocRangeEntry OBJECT-TYPE
SYNTAX MallocAllocRangeEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"An entry (conceptual row) containing the information on a
particular allocation range."
INDEX { mallocScopeAddressType, mallocScopeFirstAddress,
    mallocAllocRangeFirstAddress }
::= { mallocAllocRangeTable 1 }

MallocAllocRangeEntry ::= SEQUENCE {
    mallocAllocRangeFirstAddress        InetAddress,
    mallocAllocRangeLastAddress         InetAddress,
    mallocAllocRangeStatus              RowStatus,
    mallocAllocRangeSource              IANAmallocRangeSource,
    mallocAllocRangeLifetime            Unsigned32,
    mallocAllocRangeMaxLeaseAddrs       Unsigned32,
mallocAllocRangeMaxLeaseTime Unsigned32,
mallocAllocRangeNumAllocatedAddrs Gauge32,
mallocAllocRangeNumOfferedAddrs Gauge32,
mallocAllocRangeNumWaitingAddrs Gauge32,
mallocAllocRangeNumTryingAddrs Gauge32,
mallocAllocRangeAdvertisable TruthValue,
mallocAllocRangeTotalAllocatedAddrs Gauge32,
mallocAllocRangeTotalRequestedAddrs Gauge32,
mallocAllocRangeStorage StorageType
}

mallocAllocRangeFirstAddress OBJECT-TYPE
SYNTAX InetAddress (SIZE(0..20))
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"The first address in the allocation range. The type of this address is determined by the value of the mallocScopeAddressType object."
::= { mallocAllocRangeEntry 1 }

mallocAllocRangeLastAddress OBJECT-TYPE
SYNTAX InetAddress (SIZE(0..20))
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The last address in the allocation range. The type of this address is determined by the value of the mallocScopeAddressType object."
::= { mallocAllocRangeEntry 2 }

mallocAllocRangeStatus OBJECT-TYPE
SYNTAX RowStatus
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"The status of this row, by which new entries may be created, or old entries deleted from this table. If write access is supported, the other writable objects in this table may be modified even while the status is 'active'."
::= { mallocAllocRangeEntry 3 }

mallocAllocRangeSource OBJECT-TYPE
SYNTAX IANAmallocRangeSource
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"The means by which this entry was learned."
mallocoAllocRangeLifetime OBJECT-TYPE
SYNTAX         Unsigned32
UNITS          "seconds"
MAX-ACCESS     read-create
STATUS         current
DESCRIPTION
  "The number of seconds remaining in the lifetime of the (sub)range out of which addresses are being allocated. A value of 0 indicates that the range is not subject to aging."
DEFVAL         { 0 }
 ::= { mallocAllocRangeEntry 5 }

mallocoAllocRangeMaxLeaseAddrs OBJECT-TYPE
SYNTAX         Unsigned32
MAX-ACCESS     read-create
STATUS         current
DESCRIPTION
  "The maximum number of addresses which the server is willing to grant for each future request in this range. A value of 0 means that no specific limit is enforced, as long as the server has valid addresses to allocate."
DEFVAL         { 0 }
 ::= { mallocAllocRangeEntry 6 }

mallocoAllocRangeMaxLeaseTime OBJECT-TYPE
SYNTAX         Unsigned32
UNITS          "seconds"
MAX-ACCESS     read-create
STATUS         current
DESCRIPTION
  "The maximum lifetime which the server will grant for future requests in this range. A value of 0 means that no additional limit is enforced beyond that of mallocAllocRangeLifetime."
DEFVAL         { 0 }
 ::= { mallocAllocRangeEntry 7 }

mallocoAllocRangeNumAllocatedAddrs OBJECT-TYPE
SYNTAX         Gauge32
MAX-ACCESS     read-only
STATUS         current
DESCRIPTION
  "The number of addresses in the range which have been allocated. This value can be used to determine the current address space utilization within the scoped range. This

 ::= { mallocAllocRangeEntry 4 }
should match the total number of addresses for this scope
covered by entries in the mallocAddressTable."
::= { mallocAllocRangeEntry 8 }

mallocAllocRangeNumOfferedAddrs OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of addresses in the range which have been
offered. This number should match the sum of
mallocRequestNumAddrs for all entries in the
mallocRequestTable in the offered state. Together with
mallocAllocRangeNumAllocatedAddrs and
mallocAllocRangeNumTryingAddrs, this can be used to
determine the address space utilization within the scoped
range in the immediate future."
::= { mallocAllocRangeEntry 9 }

mallocAllocRangeNumWaitingAddrs OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of addresses in the range which have been
requested, but whose state is waiting, while the server
tries to acquire more address space."
::= { mallocAllocRangeEntry 10 }

mallocAllocRangeNumTryingAddrs OBJECT-TYPE
SYNTAX Gauge32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of addresses in the scope covered by entries in
the mallocRequestTable in the trying state."
::= { mallocAllocRangeEntry 11 }

mallocAllocRangeAdvertisable OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-create
STATUS current
DESCRIPTION "The value of this object is true if the range is eligible
to be advertised to other MAASs. When the row is first
created, the default value of this object is true if the
scope is divisible, and is false otherwise."
::= { mallocAllocRangeEntry 12 }
mallocAllocRangeTotalAllocatedAddrs OBJECT-TYPE
SYNTAX     Gauge32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The approximate number of addresses in the range which have
been allocated by any MAAS, as determined by a Prefix
Coordinator. This object need only be present if
mallocAllocRangeAdvertisable is true. If the number is
unknown, a value of 0 may be reported."
::= { mallocAllocRangeEntry 13 }

mallocAllocRangeTotalRequestedAddrs OBJECT-TYPE
SYNTAX     Gauge32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The approximate number of addresses in the range for which
there is potential demand among MAASs, as determined by a
Prefix Coordinator. This object need only be present if
mallocAllocRangeAdvertisable is true. If the number is
unknown, a value of 0 may be reported."
::= { mallocAllocRangeEntry 14 }

mallocAllocRangeStorage OBJECT-TYPE
SYNTAX     StorageType
MAX-ACCESS read-create
STATUS     current
DESCRIPTION
 "The storage type for this conceptual row. Conceptual rows
having the value ‘permanent’ need not allow write-access to
any columnar objects in the row."
DEFVAL     { nonVolatile }
::= { mallocAllocRangeEntry 15 }

--
-- the Request Table
--

mallocRequestTable OBJECT-TYPE
SYNTAX     SEQUENCE OF MallocRequestEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
 "The (conceptual) table containing information on allocation
requests, whether allocated or in progress. This table may
also be used to determine which clients are responsible for
high address space utilization within a given scope.
Entries in this table reflect requests dynamically received by an address allocation protocol.

::= { malloc 5 }

mallocRequestEntry OBJECT-TYPE
SYNTAX MallocRequestEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "An entry (conceptual row) containing the information on a particular allocation request."
INDEX { mallocRequestId }
::= { mallocRequestTable 1 }

MallocRequestEntry ::= SEQUENCE {
  mallocRequestId                      Unsigned32,
  mallocRequestScopeAddressType        InetAddressType,
  mallocRequestScopeFirstAddress       InetAddress,
  mallocRequestStartTime               Unsigned32,
  mallocRequestEndTime                 Unsigned32,
  mallocRequestNumAddrs                Unsigned32,
  mallocRequestState                   INTEGER,
  mallocRequestClientAddressType       InetAddressType,
  mallocRequestClientAddress           InetAddress,
  mallocRequestServerAddressType       InetAddressType,
  mallocRequestServerAddress           InetAddress,
  mallocRequestLeaseIdentifier         OCTET STRING
}

mallocRequestId OBJECT-TYPE
SYNTAX Unsigned32 (1..4294967295)
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "An arbitrary value identifying this row."
::= { mallocRequestEntry 1 }

mallocRequestScopeAddressType OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The type of the first address of the scope to which the request applies. Legal values correspond to the subset of address families for which multicast address allocation is supported."
::= { mallocRequestEntry 2 }
mallocRequestScopeFirstAddress OBJECT-TYPE
SYNTAX     InetAddress
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The first address of the scope to which the request applies. This must match mallocScopeFirstAddress for some row in the mallocScopeTable. The type of this address is determined by the value of the mallocRequestScopeAddressType object."
 ::= { mallocRequestEntry 3 }

mallocRequestStartTime OBJECT-TYPE
SYNTAX     Unsigned32
UNITS      "seconds"
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The number of seconds remaining before the start time of the request. A value of 0 means that the allocation is currently in effect."
 ::= { mallocRequestEntry 4 }

mallocRequestEndTime OBJECT-TYPE
SYNTAX     Unsigned32
UNITS      "seconds"
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The number of seconds remaining before the end time of the request."
 ::= { mallocRequestEntry 5 }

mallocRequestNumAddrs OBJECT-TYPE
SYNTAX     Unsigned32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The number of addresses requested. If the addresses have been allocated, this number should match the total number of addresses for this request covered by entries in the mallocAddressTable."
 ::= { mallocRequestEntry 6 }

mallocRequestState OBJECT-TYPE
SYNTAX     INTEGER {
    allocated(1),
    offered(2),   -- tentatively allocated
waiting(3),   -- waiting for more space
trying(4)     -- working on allocating

MAX-ACCESS read-only
STATUS     current
DESCRIPTION
"The state of the request. A value of allocated(1)
indicates that one or more entries for this request are
present in the mallocAddressTable. A value of offered(2)
indicates that addresses have been offered to the client
(e.g. via a MADCAP OFFER message), but the allocation has
not been committed. A value of waiting(3) indicates that
the allocation is blocked while the server attempts to
acquire more space from which it can allocate addresses. A
value of trying(4) means that no addresses have been offered
to the client, but that an attempt to allocate is in
progress."

::= { mallocRequestEntry 7 }

mallocRequestClientAddressType OBJECT-TYPE
SYNTAX     InetAddressType
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
"The type of the address of the client that (last) requested
this allocation."

::= { mallocRequestEntry 8 }

mallocRequestClientAddress OBJECT-TYPE
SYNTAX     InetAddress
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
"The address of the client that (last) requested this
allocation. The type of this address is determined by the
value of the mallocRequestClientAddressType object."

::= { mallocRequestEntry 9 }

mallocRequestServerAddressType OBJECT-TYPE
SYNTAX     InetAddressType
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
"The type of the address of the server to which the request
was (last) sent."

::= { mallocRequestEntry 10 }
mallocRequestServerAddress OBJECT-TYPE
SYNTAX     InetAddress
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The address of the server to which the request was (last)
sent. The type of this address is determined by the value
of the mallocRequestServerAddressType object."
 ::= { mallocRequestEntry 11 }

mallocRequestLeaseIdentifier OBJECT-TYPE
SYNTAX     OCTET STRING (SIZE (0..255))
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
 "The Lease Identifier of this request. If the allocation
mechanism in use does not use Lease Identifiers, then the
value is a 0-length string."
 ::= { mallocRequestEntry 12 }

--
-- the Address Table
--

mallocAddressTable OBJECT-TYPE
SYNTAX     SEQUENCE OF MallocAddressEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
 "The (conceptual) table containing information on blocks of
allocated addresses. This table may be used to map a given
multicast group address to the associated request."
 ::= { malloc 6 }

mallocAddressEntry OBJECT-TYPE
SYNTAX     MallocAddressEntry
MAX-ACCESS not-accessible
STATUS     current
DESCRIPTION
 "An entry (conceptual row) containing the information on a
particular block of allocated addresses. The block of
addresses covered by each entry in this table must fall
within a range corresponding to an entry in the
mallocAllocRangeTable."
INDEX      { mallocAddressAddressType, mallocAddressFirstAddress }
 ::= { mallocAddressTable 1 }
MallocAddressEntry ::= SEQUENCE {
    mallocAddressAddressType InetAddressType,
    mallocAddressFirstAddress InetAddress,
    mallocAddressNumAddrs Unsigned32,
    mallocAddressRequestId Unsigned32
}

mallocAddressAddressType OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The type of the first address in the allocated block.
Legal values correspond to the subset of address families
for which multicast address allocation is supported."
 ::= { mallocAddressEntry 1 }

mallocAddressFirstAddress OBJECT-TYPE
SYNTAX InetAddress (SIZE(0..20))
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION "The first address in the allocated block. The type of this
address is determined by the value of the
mallocAddressAddressType object."
 ::= { mallocAddressEntry 2 }

mallocAddressNumAddrs OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The number of addresses in the allocated block."
 ::= { mallocAddressEntry 3 }

mallocAddressRequestId OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The index of the request which caused this block of
addresses to be allocated. This value must match the value
of mallocRequestId for some entry in the
mallocRequestTable."
 ::= { mallocAddressEntry 4 }

--
-- MADCAP-specific objects
madcapConfig OBJECT-IDENTITY
STATUS    current
DESCRIPTION  "Group of objects that count various MADCAP events."
::= { madcap 1 }

madcapConfigExtraAllocationTime OBJECT-TYPE
SYNTAX     Unsigned32
UNITS      "seconds"
MAX-ACCESS read-write
STATUS     current
DESCRIPTION  "The amount of extra time on either side of a lease which the MADCAP server allocates to allow for clock skew among clients."
::= { madcapConfig 1 }

madcapConfigNoResponseDelay OBJECT-TYPE
SYNTAX     Unsigned32
UNITS      "seconds"
MAX-ACCESS read-write
STATUS     current
DESCRIPTION  "The amount of time the MADCAP client allows for receiving a response from a MADCAP server."
::= { madcapConfig 2 }

madcapConfigOfferHold OBJECT-TYPE
SYNTAX     Unsigned32
UNITS      "seconds"
MAX-ACCESS read-write
STATUS     current
DESCRIPTION  "The amount of time the MADCAP server will reserve an address for after sending an OFFER message in anticipation of receiving a REQUEST message."
::= { madcapConfig 3 }

madcapConfigResponseCacheInterval OBJECT-TYPE
SYNTAX     Unsigned32 (0..300)
UNITS      "seconds"
MAX-ACCESS read-write
STATUS     current
DESCRIPTION  "The amount of time the MADCAP server uses to detect duplicate messages."
madcapConfigClockSkewAllowance OBJECT-TYPE
SYNTAX     Unsigned32
UNITS      "seconds"
MAX-ACCESS read-write
STATUS     current
DESCRIPTION
   "The clock skew threshold used by the MADCAP server to
   generate Excessive Clock Skew errors."
 ::= { madcapConfig 5 }

madcapCounters OBJECT-IDENTITY
STATUS     current
DESCRIPTION
   "A group of objects that count various MADCAP events."
 ::= { madcap 2 }

madcapTotalErrors OBJECT-TYPE
SYNTAX     Counter32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
   "The total number of transactions for which the MADCAP
   server has detected an error of any type, regardless of
   whether the server ignored the request or generated a NAK."
 ::= { madcapCounters 1 }

madcapRequestsDenied OBJECT-TYPE
SYNTAX     Counter32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
   "The number of valid requests for which the MADCAP server
   could not complete an allocation, regardless of whether NAKs
   were sent.  This corresponds to the Valid Request Could Not
   Be Completed error code in MADCAP."
 ::= { madcapCounters 2 }

madcapInvalidRequests OBJECT-TYPE
SYNTAX     Counter32
MAX-ACCESS read-only
STATUS     current
DESCRIPTION
   "The number of invalid requests received by the MADCAP
   server, regardless of whether NAKs were sent.  This
   corresponds to the Invalid Request error code in MADCAP."
 ::= { madcapCounters 3 }
madcapExcessiveClockSkews OBJECT-TYPE
   SYNTAX Counter32
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION "The number of requests received by the MADCAP server with
   an excessive clock skew, regardless of whether NAKs were
   sent. This corresponds to the Excessive Clock Skew error
   code in MADCAP."
   ::= { madcapCounters 4 }

madcapBadLeaseIds OBJECT-TYPE
   SYNTAX Counter32
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION "The number of requests received by the MADCAP server with
   an unrecognized Lease Identifier, regardless of whether NAKs
   were sent. This corresponds to the Lease Identifier Not
   Recognized error code in MADCAP."
   ::= { madcapCounters 5 }

madcapDiscovers OBJECT-TYPE
   SYNTAX Counter32
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION "The number of DISCOVER messages received by the MADCAP
   server."
   ::= { madcapCounters 6 }

madcapInforms OBJECT-TYPE
   SYNTAX Counter32
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION "The number of INFORM messages received by the MADCAP
   server."
   ::= { madcapCounters 7 }

madcapRequests OBJECT-TYPE
   SYNTAX Counter32
   MAX-ACCESS read-only
   STATUS current
   DESCRIPTION "The number of REQUEST messages received by the MADCAP
   server."
   ::= { madcapCounters 8 }
madcapRenews OBJECT-TYPE
   SYNTAX     Counter32
   MAX-ACCESS read-only
   STATUS     current
   DESCRIPTION
      "The number of RENEW messages received by the MADCAP server."
::= { madcapCounters 9 }

madcapReleases OBJECT-TYPE
   SYNTAX     Counter32
   MAX-ACCESS read-only
   STATUS     current
   DESCRIPTION
      "The number of RELEASE messages received by the MADCAP server."
::= { madcapCounters 10 }

-- conformance information

mallocConformance OBJECT IDENTIFIER ::= { mallocMIB 2 }
mallocCompliances OBJECT IDENTIFIER ::= { mallocConformance 1 }
mallocGroups OBJECT IDENTIFIER ::= { mallocConformance 2 }

-- compliance statements

mallocServerReadOnlyCompliance MODULE-COMPLIANCE
   STATUS  current
   DESCRIPTION
      "The compliance statement for multicast address allocation servers implementing the MALLOC MIB without support for read-create (i.e., in read-only mode). Such a server can then be monitored but can not be configured with this MIB."
   MODULE  -- this module
   MANDATORY-GROUPS { mallocBasicGroup, mallocServerGroup }

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

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

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

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

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

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

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

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

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

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

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

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

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

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

GROUP  madcapServerGroup
DESCRIPTION  "This group is mandatory for servers which implement the
MADCAP client-server protocol."

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

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

OBJECT      madcapConfigResponseCacheInterval
MIN-ACCESS  read-only
DESCRIPTION  "Write access is not required."
OBJECT      madcapConfigClockSkewAllowance
MIN-ACCESS  read-only
DESCRIPTION
  "Write access is not required."
 ::= { mallocCompliances 1 }

mallocClientReadOnlyCompliance MODULE-COMPLIANCE
STATUS  current
DESCRIPTION
  "The compliance statement for clients implementing the
  MALLOC MIB without support for read-create (i.e., in read-
  only mode). Such clients can then be monitored but can not
  be configured with this MIB."

MODULE  -- this module
MANDATORY-GROUPS { mallocBasicGroup,
                     mallocClientGroup }

GROUP  mallocClientScopeGroup
DESCRIPTION
  "This group is mandatory for clients which maintain a list
  of multicast scopes."

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

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

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

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

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

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

GROUP      madcapClientGroup
DESCRIPTION
   "This group is mandatory for clients which implement the
    MADCAP client-server protocol."

OBJECT     madcapConfigNoResponseDelay
MIN-ACCESS read-only
DESCRIPTION
   "Write access is not required."
::= { mallocCompliances 2 }

mallocPrefixCoordinatorReadOnlyCompliance MODULE-COMPLIANCE
STATUS     current
DESCRIPTION
   "The compliance statement for prefix coordinators
    implementing the MALLOC MIB without support for read-create
    (i.e., in read-only mode). Such devices can then be
    monitored but can not be configured with this MIB."

MODULE      -- this module
MANDATORY-GROUPS { mallocBasicGroup,
                    mallocPrefixCoordinatorGroup }

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

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

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

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

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

OBJECT mallocAllocRangeStorage
MIN-ACCESS read-only
DESCRIPTION "Write access is not required."
::= { mallocCompliances 3 }

mallocServerFullCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION "The compliance statement for multicast address allocation
serves implementing the MALLOC MIB with support for read-
create. Such servers can then be both monitored and
configured with this MIB."
MODULE -- this module
MANDATORY-GROUPS { mallocBasicGroup,
mallocServerGroup }

GROUP madcapServerGroup
DESCRIPTION "This group is mandatory for servers which implement the
MADCAP client-server protocol."
::= { mallocCompliances 4 }

mallocClientFullCompliance MODULE-COMPLIANCE
STATUS current
DESCRIPTION "The compliance statement for hosts implementing the MALLOC
MIB with support for read-create. Such clients can then be
both monitored and configured with this MIB."
MODULE -- this module
MANDATORY-GROUPS { mallocBasicGroup,
mallocClientGroup }
GROUP  mallocClientScopeGroup
DESCRIPTION
"This group is mandatory for clients which maintain a list
of multicast scopes."

GROUP  madcapClientGroup
DESCRIPTION
"This group is mandatory for clients which implement the
MADCAP client-server protocol."
::= { mallocCompliances 5 }

mallocPrefixCoordinatorFullCompliance MODULE-COMPLIANCE
STATUS  current
DESCRIPTION
"The compliance statement for prefix coordinators
implementing the MALLOC MIB with support for read-create.
Such devices can then be both monitored and configured with
this MIB."
MODULE  -- this module
MANDATORY-GROUPS { mallocBasicGroup,
mallocPrefixCoordinatorGroup }
::= { mallocCompliances 6 }

-- units of conformance

mallocBasicGroup OBJECT-GROUP
OBJECTS { mallocCapabilities, mallocRequestScopeAddressType,
mallocRequestScopeFirstAddress,
mallocRequestStartTime,
mallocRequestEndTime, mallocRequestNumAddrs,
mallocRequestState,
mallocAddressNumAddrs, mallocAddressRequestId }
STATUS  current
DESCRIPTION
"The basic collection of objects providing management of IP
multicast address allocation."
::= { mallocGroups 1 }

mallocServerGroup OBJECT-GROUP
OBJECTS { mallocScopeLastAddress, mallocScopeHopLimit,
mallocScopeSSM, mallocScopeStatus, mallocScopeStorage,
mallocAllocRangeLastAddress, mallocAllocRangeLifetime,
mallocAllocRangeNumAllocatedAddrs,
mallocAllocRangeNumOfferedAddrs,
mallocAllocRangeNumWaitingAddrs,
mallocAllocRangeNumTryingAddrs,
mallocAllocRangeMaxLeaseAddrs,}
mallocAllocRangeMaxLeaseTime, mallocAllocRangeSource,
mallocAllocRangeStatus, mallocAllocRangeStorage,
mallocScopeDivisible, mallocScopeSource,
mallocScopeNameScopeName, mallocScopeNameDefault,
mallocScopeNameStatus, mallocScopeNameStorage,
mallocRequestClientAddressType,
mallocRequestClientAddress
}

STATUS current
DESCRIPTION
"A collection of objects providing management of multicast
address allocation in servers."

::= { mallocGroups 2 }

mallocClientGroup OBJECT-GROUP
OBJECTS { mallocRequestServerAddressType,
mallocRequestServerAddress }

STATUS current
DESCRIPTION
"A collection of objects providing management of multicast
address allocation in clients."

::= { mallocGroups 3 }

madcapServerGroup OBJECT-GROUP
OBJECTS { madcapConfigClockSkewAllowance,
madcapConfigExtraAllocationTime, madcapConfigOfferHold,
madcapConfigResponseCacheInterval,
madcapTotalErrors, madcapRequestsDenied,
madcapInvalidRequests, madcapBadLeaseIds,
madcapExcessiveClockSkews, madcapDiscovers,
madcapInforms, madcapRequests,
madcapRenews, madcapReleases }

STATUS current
DESCRIPTION
"A collection of objects providing management of MADCAP
servers."

::= { mallocGroups 4 }

madcapClientGroup OBJECT-GROUP
OBJECTS { mallocRequestLeaseIdentifier,
madcapRequestLeaseIdentifier,
madcapConfigNoResponseDelay }
5. IANA Considerations

The IANA-scopeSource and IANA-mallocRangeSource textual conventions are imported from the IANA-MALLOC-MIB. The purpose of defining these textual conventions in a separate MIB module is to allow additional values to be defined without having to issue a new version of this document. The Internet Assigned Numbers Authority (IANA) is responsible for the assignment of all Internet numbers, including various SNMP-related numbers; it will administer the values associated with these textual conventions.

The rules for additions or changes to the IANA-MALLOC-MIB are outlined in the DESCRIPTION clause associated with its MODULE-IDENTITY statement.

The current versions of the IANA-MALLOC-MIB can be accessed from the IANA home page at: "http://www.iana.org/".
6. Security Considerations

There are a number of management objects defined in this MIB module with a MAX-ACCESS clause of read-write and/or read-create. Such objects may be considered sensitive or vulnerable in some network environments. The support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations. These are the tables and objects and their sensitivity/vulnerability:

mallocScopeTable,mallocAllocRangeTable:
Unauthorized modifications to these tables can result in denial of service by not being able to allocate and use multicast addresses, allocating too many addresses, allocating addresses that other organizations are already using, or causing applications to use a hop limit that results in extra bandwidth usage.

mallocScopeNameTable:
Unauthorized modifications to this table can result in incorrect or misleading scope names being presented to users, resulting in potentially using the wrong scope for application data.

madcapConfigExtraAllocationTime,madcapConfigOfferHold:
Unauthorized modifications to these objects can result in reservations lasting too long, potentially resulting in denial of service if allocation ranges are small.

madcapConfigNoResponseDelay:
Unauthorized modifications can result in a client not being able to allocate multicast addresses.

Some of the readable objects in this MIB module (i.e., objects with a MAX-ACCESS other than not-accessible) may be considered sensitive or vulnerable in some network environments. It is thus important to control GET and/or NOTIFY access to these objects and possibly to encrypt the values of these objects when sending them over the network via SNMP. These are the tables and objects and their sensitivity/vulnerability:

mallocRequestLeaseIdentifier:
If address allocation servers are configured to allow renewal or release purely on the basis of knowledge of the Lease Identifier, then unauthorized read access to mallocRequestLeaseIdentifier can be used in a denial-of-service attack.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPSec), there is no control as to who on the secure network is allowed to
access and GET/SET (read/change/create/delete) the objects in this MIB module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [RFC3410], section 8), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured for only those principals (users) with legitimate rights to have access to GET or SET (change/create/delete) objects.

7. Acknowledgements

This MIB module was updated based on feedback from the IETF’s Multicast Address Allocation (MALLOC) Working Group. Lars Viklund, Frank Strauss, and Mike Heard provided helpful feedback on this document.

8. Intellectual Property Statement

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9. References

9.1. Normative References


9.2. Informative References


10. Author’s Address

Dave Thaler
Microsoft Corporation
One Microsoft Way
Redmond, WA  98052-6399

Phone: +1 425 703 8835
EMail: dthaler@microsoft.com
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